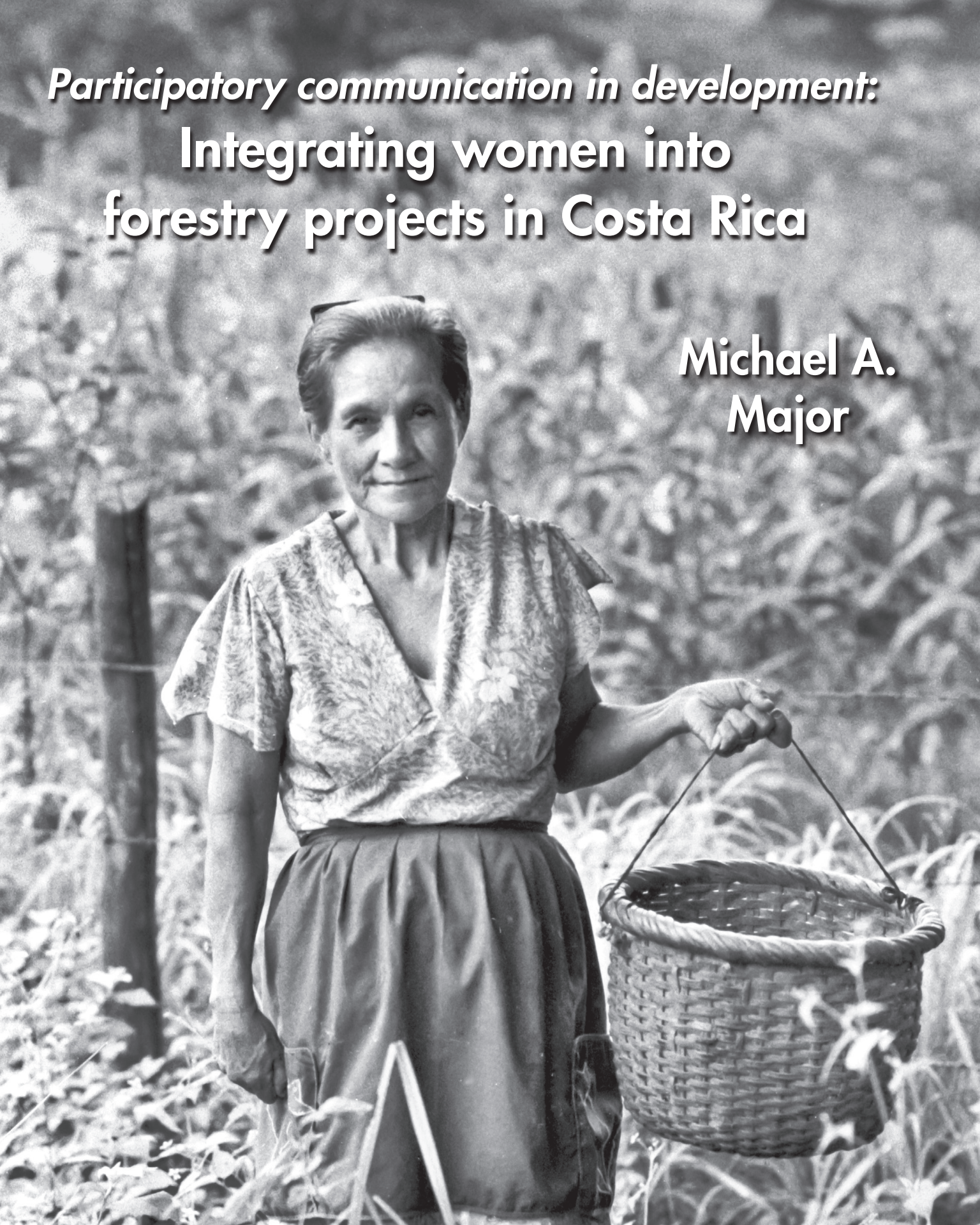


Participatory communication in development:
**Integrating women into
forestry projects in Costa Rica**

**Michael A.
Major**



Participatory communication in development: integrating women into forestry projects in Costa Rica

Michael A. Major

A thesis submitted in partial fulfilment of the
requirements for the degree of

Master of Science

in agricultural journalism at the
University of Wisconsin-Madison
1987

© 1987 Michael Major. All rights reserved.

Suggested citation:

Major, M.A. (1987) Participatory communication in development: integrating women into forestry projects in Costa Rica. Unpublished Master's thesis. Department of Agricultural Journalism, University of Wisconsin-Madison.

Contact: Michael Major – mmajor@michaelmajor.com.au

Table of Contents

Abstract	3	Chapter Five: Results	20
Acknowledgements	3	Case studies	20
Conversions	3	COOPEMATAMBU	20
Institutional abbreviations	3	<i>Creation of group</i>	20
Chapter One: Introduction	4	<i>Establishment of forest plantation</i>	21
The problem	4	<i>Technical assistance</i>	22
Objectives of the study	4	<i>Credit</i>	22
Chapter Two: Integrating women into forestry research and extension	5	<i>Market/profit</i>	22
Participatory communication in development	5	<i>Members</i>	22
Integrating women into forestry project design	5	<i>Observations</i>	23
<i>Utilizing women's knowledge</i>	6	Asociación para la Promoción de la Mujer en Monte Romo	23
<i>Recognition of women's activities</i>	6	<i>Antecedents</i>	23
<i>Women as an aid to research</i>	6	<i>Creation of group</i>	23
Technology assessment	6	<i>Description of activities</i>	23
<i>Who benefits?</i>	7	<i>Technical assistance</i>	24
<i>Is it better?</i>	8	<i>Financial assistance</i>	25
<i>Is it acceptable?</i>	8	<i>Market</i>	25
<i>Is there a need?</i>	8	<i>Members</i>	25
<i>Is there access?</i>	9	<i>Observations</i>	25
Communication strategies	9	Tree seed collection	25
<i>Need for female extension agents</i>	10	<i>The case of Doña Pacha</i>	25
<i>Women's groups</i>	11	Survey results	26
Different models to education and training	11	<i>General description of the study area</i>	26
Chapter Three: Setting	13	<i>Description of families</i>	26
General aspects of the zone	13	<i>Participation in tree planting</i>	27
Agrarian trends	13	<i>Participation in reforestation projects</i>	27
Communal organizations	14	<i>Membership to organizations</i>	28
County Agricultural Center of Hojanca (CACH)	14	<i>Division of labor in forestry activities</i>	29
Association of Integrated Development	14	<i>Contribution of women to reforestation</i>	29
COOPEPILANGOSTA	14	<i>Extension</i>	30
Cattle Ranchers' Chamber	14	<i>Incentives for women's participation</i>	31
Reforestation projects	14	Chapter Six: Conclusions and policy implications	32
<i>Fuelwood project and Madeleña</i>	14	Methodology	32
IAF/CACH/CORENA forestry project	15	Women's current role in forestry activities	32
Chapter Four: Methods	17	Women's potential role in forestry activities	32
Objectives of the study	17	Constraints to women's participation	33
Site selection	17	Possible activities	33
Survey	17	<i>Family nurseries</i>	33
Questionnaire design	17	<i>Seed collection</i>	33
Pre-test	17	<i>Managing plantation</i>	33
Sample selection	18	<i>Husband persuasion</i>	33
Data collection	18	<i>Recommended strategies</i>	34
Data analysis	18	<i>Popular participation</i>	34
Case studies	18	<i>Extension and training</i>	34
		Research needs	34
		Appendix 1: Questionnaire	36
		Bibliography	39

Abstract

This study describes case studies of three activities where women or a group of women participate in forestry activities in an area of Costa Rica where a number of reforestation projects are being implemented. The three case studies describe a women's cooperative which has established a one-hectare fuelwood and timber plantation, an informal women's group that has established tree nurseries and a 60-year-old woman who collects tree seeds in a nearby plantation and sells them for a sizeable family income.

To determine the current and potential forestry activities of women in a sample area we conducted a survey among 50 households by simultaneously interviewing the husband and the wife. The results indicate that women currently play a small role in forestry activities. Nevertheless the majority of the women believe

they could contribute to forestry and expressed strong interest in being included.

Although women's participation in forestry in the zone is currently small, there appears to be a great potential for integrating them into forestry projects. Women could play a significant role not only in planting trees, collecting seeds and maintaining tree nurseries but also in persuading their husbands to participate in reforestation.

To integrate women, reforestation projects could apply the Havelock user-oriented model to a group of women. Using the model women will identify their needs, diagnose their problems and, with nondirective guidance from an external agency, develop strategies that may include forestry activities.

Acknowledgements

I would like to thank a number of institutions and individuals for their kind and generous support. The Inter-American foundation and the Ibero-American studies program of the University of Wisconsin-Madison provided travel funds and a living allowance; the Madeleña project at the Tropical Agricultural Research and Training Center (CATIE) in Turriabla, Costa Rica provided me with secretarial assistance, photocopying services, transportation and technical assistance;

The Department of Campesino Development of the Costa Rican Forestry Service (DGF) provided me with research assistants and vehicles;

Mariano Quesada, Olman Morales and Jane Segleau of the Costa Rican Forest Service contributed immeasurably to the study by offering keen insights into the study area and valuable ideas regarding the conceptual approach to the study and its methodology;

Carlos Reiche of Madeleña was a great aid to me both in developing the study and in helping me organize the study's logistics;

Henry Tschinkel of USAID first suggested to Madeleña that I conduct a study and provided assistance to me during the summer; Gilber Canet, head of the Department of Campesino Development, and Walter Picado, coordinator of Madeleña in Costa Rica, recognized the importance of the study and allocated scarce personnel and resources to the study;

My thesis committee at the University of Wisconsin, Marion Brown, Dick Powers and John Fett, aided me both as instructors and as research advisors. Marion Brown, my advisor, offered me kind support and advice throughout the development of this thesis and contributed greatly to the final revision of the study. Dick Powers was always willing to help me with the statistical analysis and John Fett contributed in the research proposal and offered important comments on the draft of the thesis.

Conversions

One U.S. Dollar = 65 Costa Rican colones

Institutional abbreviations

ACRONYM	SPANISH/ENGLISH NAME
CACH	Centro Agrícola Cantonal de Hojancha
	County Agricultural Center of Hojancha
CATIE	Centro Agronómico Tropical de Investigación y Enseñanza
	Tropical Agricultural Research and Training Center
CODESA	Corporación Costarricense de Desarrollo
	Costa Rican Development Corporation
CONAI	Comisión Nacional de Asuntos Indígenas
	National Commission for Indian Affairs
CORENA	Programa para la Conservación de Recursos Naturales
	Conservation of Natural Resources Program
DGF	Dirección General Forestal
	Forest Service
IDA	Instituto de Desarrollo Agrario
	Agrarian Development Institute
IMAS	Instituto Mixta de Ayuda Social
	Social Assistance Office

Chapter One: Introduction

The problem

Because of the alarming rate of deforestation in Costa Rica many national and international agencies have promoted reforestation projects. However, reforestation efforts of maybe 1,000 to 2,000 hectares per year are negligible when compared to the annual deforestation rate of 60,000 to 70,000 hectares in Costa Rica. Whereas many reforestation projects have been successful and have resulted in planting trees over large areas, this area is minimal compared to the amount of land that should be reforested in order to meet the fuelwood and timber demands of the people as well as protect the soil and provide an adequate water supply.

According to projections done by the Costa Rican ministry of planning in 1978 (Hartshorn, 1982), the reforestation situation is serious; even if the existing forest is managed and the annual deforestation is reduced, by the year 2012 the country will have a lumber deficit and will have to import it at a rate of 1.1 million m³ in the first year of deficit and increasing to five million m³ annually over a period of 25 years. Considering that the current average price of wood on the international market is us\$500/m³, importing wood will be an impossible burden for the country (Hartshorn, 1982).

Costa Ricans do not maintain a tradition of planting trees. Until only very recently, they saw forests merely as obstacles they needed to clear in order to assure a prosperous country. Changing this attitude may take several generations. But Costa Ricans do not have the time to slowly infuse a tree planting tradition among its populace. Strong reforestation incentives should be given to all sectors of society so that Costa Rica can reverse this trend.

Evaluations of many forestry projects show that project success is generally lower if the intended clients do not actively participate in all phases of project design and implementation. Before any forestry project can be initiated, project designers must understand the socioeconomic and cultural patterns of their clients. Project designers must consider the needs and goals of the people, how they can be reached, under what conditions the people would participate and how benefits accruing from the project would be appropriated and distributed. If the project is to be successful, designers must integrate technical expertise with

solutions that are acceptable to the beneficiary population. This may even mean that the most efficient technical solution will have to be postponed until widespread acceptance is forthcoming.

Traditionally, reforestation projects have been oriented toward men. Nevertheless, some project promoters now realize that women have been quite active in forestry activities and could be vital to the success of reforestation projects. In various parts of the world, women's role in forestry has been clearly documented. Nevertheless since the sexual division of labor is culture bound we can make few generalizations about, for example, women's role in forestry in Africa with their role in Latin America.

Objectives of the study

To date there have been no significant empirical studies or theoretical thought pieces that have examined women's role in forestry in Costa Rica. This study therefore is an exploratory study from which future studies can be based. This study examines the potentials for integrating women into a reforestation project in northwestern Costa Rica. The study attempts to:

1. Identify what forestry-related activities women now partake in;
2. Identify the constraints to their participation in future activities;
3. Identify the activities that would be most suited for them;
4. Identify possible strategies to integrate women into reforestation projects;
5. Test a survey methodology.

This study was conducted based on an original request by the Madeleña project at the Tropical Agricultural Research And Training Center (CATIE) in Turrialba, Costa Rica. The study is intended to be a guide from which Madeleña can base policy decisions regarding their reforestation efforts in Hojanca. A survey was conducted to give Madeleña a clearer idea of the current attitudes toward and activities in reforestation of a selected population and case studies were written to offer Madeleña evidence of the potentials and constraints of integrating certain women into their projects.

Chapter Two: Integrating women into forestry research and extension

Participatory communication in development

Most forestry and agricultural research and extension in developing countries have been based on the U.S. classical model of the diffusion of innovations. The pattern often followed is a research center produces an innovation, authorities uncritically accept its supposed advantages and extensionists trigger a diffusion system to convince the farmers to adopt it (Diaz Bordenave, 1976). Beltran (1976) criticizes this model since “it seriously suffers from insensitivity to contextual and socio-structural factors in society.” Since the socio-economic structure usually favors adoption of innovations by individuals with higher socio-economic status, the diffusion process often increases inequity in development (Roling, 1976). This inequity is created not only between rich and poor farmers, but also between men and women.

Many extension workers and assistance agencies tend to virtually ignore social and institutional structures while promoting development (Felstehausen, 1973). This top-down approach to planning and executing government programs has caused a great number of failures. Introducing technology in rural areas without some type of local feedback may lead towards a more rapid breakdown of the traditional social order. Development planners now recognize the importance of popular participation which encourages feedback from the intended users of the recommended technology. Many projects are now implemented under the basic tenet that people are – and should be – the starting point, the center, and the end goal of each development intervention (Cernea, 1985). There is a growing consensus that policy makers can accelerate development if they mobilize the energies and resources of the people and understand that the poor have a basic right to take part in making the decisions that affect their lives and livelihoods (Harrison, 1983).

Nevertheless, officials in forestry agencies often have little incentive to investigate in detail the specific requirements of small farmers, including women. They assume they know what the small farmer needs, but that he is an intractably conservative late adopter. Thus forestry specialists tend not to be information seekers, but primarily information purveyors.

Although much has been written about “popular participation” it could go the way of so many other buzz words – a paragraph in a report suggesting its importance and very little follow up. If they are to encourage local participation, planners must first accept the validity of local views, and incorporate local participation into project design as a regular feature of project formulation and decision making. If the local community is not involved in formulation and decision making, it is probably because the planners assume that people do not know what they want – an assumption that is palpably inaccurate. The consequence is often failure.

Local participation can be obtained only by understanding the local community structure and its needs, communicating with the community about the techniques to be used, explaining

the meaning of the project and the way in which it will deal with community problems, and obtaining the community's consent to the program (Noronha and Spears, 1985).

Integrating women into forestry project design

During much of the past quarter century, decision makers have viewed “development” as the panacea for the economic ills of less developed countries. Supposedly by creating a modern infrastructure, development will allow the economy to take off, thus providing a better life for everyone. Yet in virtually all countries and among all classes, women have lost ground relative to men. Development, by widening the gap of incomes between men and women, has not helped improve women's lives, but rather has had an adverse effect upon them (Tinker & Bramsen, 1976).

Until the publication in 1970 of Ester Boserup's women's role in economic development, the development profession gave little attention to women's participation in forestry and agriculture. Boserup's work did much to correct this gap by demonstrating the important role of women in subsistence agriculture as well as in the rural labor force of many third world economies. Boserup distinguished between male and female farming systems in subsistence agriculture. In the former, men produce the food with little help from women; in the latter women produce the food with little help from men. Female farming systems are generally based on extensive shifting cultivation, whereas male farming systems are usually characterized by intensive plow agriculture. Rural-urban migration by men seeking wage-work has tended to change many farms in developing countries into almost exclusively female-operated systems.

Census estimates of women's agricultural participation uniformly indicate that women's participation in agriculture and forestry is insignificant compared with men's. Nevertheless Deere (1982) and others contend that these figures underestimate female participation due to faulty conceptual categories for measuring women's farm participation.

Since statistics do not show women working, planners rarely consider women in their projects. Frequently new projects intrude on activities in which women are already engaged and whereas women would seem the likely candidate for services or training, assumptions about proper sex roles dictate that men receive the new training, new laws, or new loans. The gap widens.

A study of 43 World Bank forestry projects found that only eight made specific reference to women (Scott, 1980). This state of affairs is partly due to the masculine images that the word “forestry” conjures up. The reality is, however, opposed to the image. Women have traditionally played important roles in agricultural production and in the use and management of trees. During the late 1970s development planners finally began to notice the “invisibility” of the female labor force in forestry and agriculture. A number of conferences dealing with women in

development awakened some policy makers who gradually began to incorporate women in their projects.

Utilizing women's knowledge

Forestry project designers rarely consult women, who are frequently the ultimate beneficiaries of many projects, at the design stage. By ignoring women, the designers fail to incorporate an important source of information that may be critical to project success. Women's knowledge about topics such as water and fuelwood supply can be helpful in designing rural development projects. For example, project workers in the Upper Volta dug wells to inadequate depths because only men were involved in its design and implementation. The project designers did not consult the village women even though they were responsible for collecting water from wells and had a better knowledge of the depth to which wells should be dug to retain water year-round. At the end of the wet season when the water table dropped, the wells went dry (Carr, 1985a: 126).

Women can also be sources of information concerning alternatives. Descriptions of women's role in fuelwood collection and use rarely point out that women also experiment and innovate, turning to alternate fuels such as local plant stalks, dung, and even imported charcoal. Women are not only victims of changes in firewood supplies; they actively seek everyday solutions to fuel location and conservation and demonstrate expertise regarding burning qualities of various local woods and of firewood alternatives (Hoskins, 1981). Local women can tell which species provide a long-lasting and low heat, which provide a quick high heat, which smoke, and so on. When fuelwood is used for cooking and heating, such characteristics can be decisive. Without the right information, foresters could produce a plantation of quick-growing wood that does not meet local needs (Fortmann, 1986). For example, Hoskins reports that the men of one community planted a fast growing eucalyptus species, but the women rejected it since it imparted a "vicks-vapo-rub" taste to food.

Recognition of women's activities

Not only are women's expertise and knowledge generally unnoticed, but sometimes their activities are invisible even to local village men. This important realization means that program designers must make an extra effort to inquire beyond the more easily available answers that male leaders offer. Hoskins (1981) says that although she requested a meeting to talk only to women, both men and women gathered in a group. When asked questions on fuel problems the men answered while the women stood in what looked like silent agreement. Several spokesmen stated that wood was getting more expensive, citing figures on the weekly cost of fuelwood per family. Only upon observing no wood and requesting to see a fireplace was it possible to see the wives alone and discover that there had been no wood available for a number of months. Women were, in fact, burning dung. The men had never noticed the lack of firewood. The women's chores – and choices – had been invisible.

Women as an aid to research

Including women in forestry research could also speed up the rate of adoption. Petheram and Basuno (1986) expounded on the advantages of including women in farming systems research in Java. They noted that slow progress in livestock development may be partly associated with practical difficulties in achieving the degree of farmer contact needed in livestock research, while working mainly with male stock-rearers. Most men in Java spend daylight hours working away from home and feel too busy to become involved in trials of new livestock technology. Men also have little experience in group participation because of lack of time and opportunity. Also men have little formal education or training and have little knowledge of health, nutrition or reproduction. The advantages of working with women include the ease of communication during daylight working hours; interest among women (and some training) in nutrition, health and reproduction; and the ability of women to manage animals in farm trials requiring constant supervision.

Technology assessment

Before they implement any forestry project, officials must critically assess the technology or forestry practice that they want to implement. The very innovation at times causes great inequality. The social and economic consequences of an innovation as a whole have rarely been considered (Rogers, 1978). As Byrnes (1968) notes, very seldom does one find diffusion studies which analyze the technical quality, the timeliness and the cultural and social compatibility of the recommended innovation. Often the innovation favors some groups of farmers at the expense of others. Diaz Bordenave (1976) suggests that greater attention be placed on the innovation as an independent variable rather than a dependent variable to determine its effect in promoting inequality.

Project managers run a good risk of having a highly inappropriate technology with all sorts of negative consequences when they introduce an innovation without a knowledge, understanding and analysis of the political, economic, social and patriarchal structures of a given situation and of the impact and implications of the innovation for these structures.

Development planners now recognize that the enormous diversity of local agro-socioeconomic conditions among traditional farming systems is a significant constraint on the diffusion of borrowed forestry innovations. Before developing an appropriate technology, planners must gather information about the diversity of farm-level constraints to which technology must be adapted. It is the farmers themselves who test the viability of recommended technologies and also modify and adapt technology to specific conditions. Appropriate channels of information feedforward and feedback between extension and research systems regarding constraints and farmers' experience with new technologies are needed in order for improved forestry practices to be rapidly accessible to the majority of small farmers.

Communication and direct contact with women in their capacity as important contributors to farm management and production are also essential to this strategy. First, the special problems women face as agricultural producers need to be identified if these women are to benefit from new appropriate technology and forestry practices. Second, women frequently participate in farm family decision-making and manage specific components of production (such as staple food crops) therefore, forestry extension strategies need to directly involve women who allocate resources or implement new techniques.

Most of the recent literature on the diffusion of innovations now acknowledges that technologies are not value free or value neutral. Technologies are embedded in, and carry, social values, institutional forms, and culture. It is also true, though less often acknowledged, that innovations are not gender neutral. Because in every society there is a gender-based division of labor, innovations have differential impacts on men and women.

Technical change affects women and men differently due to differences in work responsibilities and time allocation, control of resources and access to credit and advice. The way rural women divide their time between farm, household and off-farm employment affects the way they manage food consumption and make farm and household decisions. All of these in turn influence the rates of adoption of forestry technology and practices. The characteristics of women's participation in forestry are an integral component of the location-specific constraints to which technology and extension must be adapted. This requires looking not only at the household unit but at production relations and access to assets between the sexes as well.

Rochleau (1987:80) comments on how new forestry practices may imply new demands on women clients. Depending on the circumstances these demands could be negotiating new arrangements for using and managing shared lands (household or community), new labor or capital inputs, learning new skills, and closer management of soil, water, plants and animals in existing woodland, cropland, pasture or boundary lands. On the other hand these new forestry practices may serve to validate women's land and tree use rights or claims to ownership, to increase production, to decrease gathering time and to reconcile conflicting objectives for shared household or community plots.

In some countries, several forestry practices and technology devices have gained widespread acceptance and have proved to be of help to rural families. In others, however, attempts at implementation have failed to get beyond the pilot project stage. In addition, many of the technology projects which have been applied on a more widespread basis have had minimal impact in terms of assisting women to contribute more fully to community and national development.

This has obviously given rise to considerable debate about the nature of the dissemination process. Technologists argue that the problems are of a purely institutional nature and that there is nothing inherently wrong with the hardware devices themselves. Others have argued that the difficulties are often technical as well

as institutional, and that it is the tendency to try separating these two interrelated aspects of technology projects which contributes to their lack of impact. Still others argue that poor extension practices lead to low adoption rates. All are probably correct. But perhaps the first step is to look critically at the technology in question and analyze its impact on women.

Who benefits?

Some development planners frequently argue that there is no need to ensure that women have direct access to technological improvements since anything which is disseminated to men will eventually trickle down to their wives. Further, they often assume that a redistribution of earning capacity to women from men is unimportant as long as the end result is a net increase in total family income. Thus development programs have tended to offer credit, improved technologies and training only to men, enabling them to grow cash crops on land women previously used for family food production and to take over village industries women traditionally controlled. The choice of an inappropriate technology often has limited impact and, in some cases, has even resulted in an absolute worsening of conditions for women.

In some instances new farming practices have led to an increase in cash crops, depriving women of land they had previously farmed for food, or diminishing their access to the returns of their own labor when cash-cropping becomes a male-controlled enterprise (Palmer, 1977). In this situation, women have proved unwilling to contribute labor to new cash crops because they benefit only peripherally.

Having access to credit through the co-op, the man is able to buy equipment such as an ox-drawn plow, a seeder or a hoe, as well as inputs such as fertilizer and improved seed. Inevitably, men use the equipment first on their field. If women wait until late in the season to use the equipment to work their fields, yields would be badly affected. Given that women are often responsible for providing the bulk of the family food from their own fields, it is not surprising that they often choose to proceed with land preparation, seeding and weeding in the traditional way.

Thus family ownership of improved farming equipment does not necessarily result in any time saving for women. However, one would expect the family to gain other benefits if the equipment leads to an increase in the acreage farmed by the man or an increase in yields per acre on his fields. Unfortunately, this does not always follow. Since feeding the family is thought of as the woman's responsibility, the man often sells any extra crops he is able to grow rather than using the surplus to augment the family's diet. Similarly, the income received from the sale of crops is more likely to be spent on semi-luxury goods than on basic necessities such as food and clothing for the children (Carr, 1985a). Palmer (1977) notes that it is not uncommon for nutritional levels to fall while wrist watches, transistor radios and bicycles (all largely consumed by men) find their way into the household.

The way in which development agencies have introduced new technologies have tended to contribute to the undermining

of women's traditional roles. Men learn to operate new types of equipment so that women lose control over production processes and income derived from them, or experience a decline in employment opportunities as their labor is displaced (Tinker, 1976). Small implements such as presses, grinders, or cutters generally have been introduced to men, even when the work for which they are a substitute traditionally has been done by women. This happened with the introduction of large-scale processing of the palm oil mills in Nigeria which took small-scale processing of the palm fruit out of the hands of the women and deprived them of the income they once used to derive from this. Men also purchase and operate tortilla-making machines in Mexico and sago-processing machines in Sarawak – because only men have access to credit or to money (Tinker, 1976). The availability of corn grinders in Kenya, for example, clearly saves women many hours of manual effort – though they spend hours traveling to the grinding center. Women themselves are not taught to operate these grinders.

Scott and Carr (1985) estimate that 1.4–2.0 million women in rural areas of Bangladesh have lost a traditional source of part-time employment due to the spread of steel rice hullers. Scott and Carr differentiate among three categories of women in order to estimate the impact of this labor displacement. First, female members of large surplus farms, in general, have benefited from the change in technology. Although they did not process rice traditionally themselves, they had to supervise hired female labor who did. In using the mill, they have more leisure time and their families have benefited economically by displacing wage labor with cheaper milling costs. Second, female members of subsistence farms who previously processed rice traditionally benefit from the rice mill by relieving themselves from time-consuming and physically-demanding labor. Their ability to pay cash for milling costs, and in some cases transportation costs, restricts their use of the mill, however. Third, wage labor women from landless families who process rice traditionally to augment family income have suffered as a result of technological change in the absence of alternative employment.

Is it better?

Any device or forestry practice which results in more work without adequate economic return, or involves additional expenditure without measurable benefits, is unlikely to gain acceptance with rural women. Developing such devices in the first place seems to indicate a lack of understanding of the traditional way of doing things and a lack of appreciation of the wider implications of technical change. This would be less likely to happen if technologists and rural development staff worked more closely together at collecting at the village level data aimed specifically at identifying where problems exist and at specifying the nature of the technology package best able to overcome them.

In Sierra Leone, development workers attempted to introduce improved mud stoves that would reduce the amount of smoke inside the house and thus make the home environment more

pleasant. These stoves met with little success since the new stoves used much more firewood than the traditional stoves. Their use would therefore have meant a diversion of either time (for gathering wood) or money. There were obviously things that women preferred to a smoke-free kitchen (Carr, 1985a: 134).

Cases like this have created the myth that rural women are resistant to the changes brought about by the introduction of new technologies. However, women who are working up to 18 hours a day to provide the basic essentials of life for their families are unlikely to reject anything within their access which could improve their situation as they perceive it. If they do reject a new technology, it is almost always because it is one which would make the current situation worse rather than better.

Is it acceptable?

Practices and customs vary considerably between and even within countries and a technology or tree crop which is appropriate in one place may be less so somewhere else. Emotions tend to run high when projects run up against this kind of obstacle, with technologists complaining about the conservatism of rural women. However, traditions cannot be changed over night and, in any case, we should remember that one of the basic premises of the appropriate technology movement is that technology should be adapted to the needs of people, rather than people having to adapt to them (Carr, 1985a).

Although some technologies may appear to be “appropriate” in the eyes of the technologist and development workers, the people who expect to use them – the rural women – may not think them appropriate at all. This seems to have been the case with much of new cooking technologies which reduce the need for firewood. In the rush to save the rapidly diminishing forests, technologists seem to have proceeded so far without giving any due consideration to a number of relevant factors such as the end users’ acceptability of their products. For example, there has been a proliferation of solar reflective cookers which women can use to prepare food without fuelwood. Unfortunately, developers of this technology ignored prevailing customs and conditions in the villages. Such cookers must be placed directly facing into the sun and have to be constantly adjusted as the sun moves. Since the main meal of the day is usually cooked in the evening when the sun has either set or has lost most of its strength women have not accepted them. An additional disadvantage is that they cannot support a sufficiently large pot to cook a full meal for a large family. In addition, village women in many countries are accustomed to cooking indoors and are hostile to the idea of moving their stoves into the open – especially into the direct sunlight (Carr, 1981:197).

Is there a need?

It seems trite to say that project design must be related to the needs of the target population. However, often this does not happen, and design is based on an armchair assessment of what officials believe the target population needs. Such an approach leads only to “surprises” when the project is implemented – for example, the

demand for certain types of seedlings is less than estimated. The design must be related to a local assessment of needs – not on the basis of the entire project area, since needs vary between regions and between different groups within a region.

Local priorities may differ from those of the proposed forestry project. Villagers may see their greatest need as being water or roads, and forestry may be low on their list of priorities. In these cases it may be necessary to consider how to meet the priorities of the villagers while promoting forestry. For example, if the greatest perceived need is for a village water supply, the designers should estimate whether the sale of produce from the proposed village woodlot could help attain that goal while also demonstrating the benefit of tree planting.

Diffusion campaigns often fail because change agents are more innovation-minded than they are client oriented. They “scratch where their clients don’t itch” (Rogers, 1983:319). Obviously, very little success can be expected in trying to introduce new technologies for which people see no immediate need. This applies particularly to technologies such as pit latrines and soak pits which are related to improving the home environment and are widely diffused. In most African countries, for example, the majority of women immediately state they need help with carrying water, producing fuel and food and processing crops. Very few mention they need better sanitation (Carr, 1985a). Pit latrines and other sanitation aids are important, but they will be met with little enthusiasm at the village level while more pressing problems such as provision of water and fuel remain unsolved.

Resources that are wasted in providing rural people with technologies and forestry practices they don’t want could be far better used on prefeasibility studies to help identify the priority needs of target groups and to plan the type of technical intervention best capable of meeting these needs. Developing technology packages in accordance with people’s priorities makes more sense than introducing anew technology (for reasons which may be unrelated to village needs) and then implementing other interventions to persuade people to use it.

When the target group is rural women, and particularly in areas where it is difficult for men to communicate directly with women, strategies such as employing female interviewers or working through existing women’s programs have normally succeeded in identifying the women’s needs. Their husbands’ interpretations of their needs often give a very biased view of the real situation (Carr, 1985b).

Is there access?

Rural women are not using many improved technologies which are appropriate and are not participating in projects because – in one way or another – they are denied access to them. In many cases, rural women are completely unaware of the existence of improved technologies and projects which could help them. When information does filter down to the village level, it is usually the men who receive it. This is because most extension workers in rural areas are men who, by choice or custom, tend to

communicate only with other men, even if the information relates to work that women perform.

When women do learn of the existence of certain technologies and projects, further obstacles are placed in their way. They lack the purchasing power for many of the technologies which they could use to promote rural development. They are often denied credit because the land and buildings which are needed as collateral are held in the men’s names. Furthermore, they rarely have access to advice on how to form themselves into a cooperative scheme that may lend itself to possibilities of obtaining credit (Carr, 1985b).

Communication strategies

Selecting the proper technology is only the first step in improving the conditions of rural women. Since women are often denied access to information, creative communication strategies are needed if projects are to reach large numbers of women. Such strategies must compensate for (1) time constraints (particularly among low-income women) limiting ability to participate in group meetings, demonstrations or training courses; (2) low levels of literacy and schooling; and (3) the shortage of women extension staff (Ashby, 1981).

Before any attempt is made at developing a communication strategy, project personnel should study the communication patterns between men and women and between women themselves. Information networks among women in rural areas may be a valuable resource for effective communication of forestry information. The networks communicate vital information rapidly and are a primary means by which women influence opinion and behavior. Based on her findings that women appeared to discuss farming matters with others more often than men (61 percent of women reported doing so and 19 percent of men), bond (1974, quoted in Ashby, 1981) suggests that women may diffuse ideas faster than men.

Establishing direct communication linkages with women may also serve to enlist men’s support for forestry innovations. Anthropological studies of women’s use of gossip to influence community affairs and to affect the decisions of men within and outside their families suggest that women have greater effective informal power than men with regard to information and opinion control (Harding, 1976). Women also use gossip, insult and mockery to control community behavior.

Any communication strategy must also consider what is the relevant unit for communication purposes and decision making – husband and wife, women only, or men only? In an analysis in Indonesia, Wahyuni et al. (1987) found that husbands and wives have very different perceptions of the wife’s relative participation in the decision-making process concerning sheep and goat management. The women’s participation in decision making, as reported by men, was markedly lower than the women’s perception of their participation. This study indicates that women perceived they played the major role in decision making for small ruminant production while men perceived just the opposite.

Need for female extension agents

Extension programs which assume a male farming system, as do those of Europe and the United States, are quite inappropriate under conditions where females comprise a large portion of the rural labor force. Extensionists in the northern hemisphere focus on the man as producer, while the home economists work with the woman as the cook and home manager. These strategies have focused primarily on women's reproductive, child care and homemaker activities. However, the rural farming woman of many developing countries plays both of these roles.

Many projects have proceeded on the belief that male extension workers can simply talk to the men and all will be well. The literature is replete with examples of failed projects based on this notion. It doesn't work because the men may never pass the information on to the women, or they may pass on the wrong information. Also, women head between a quarter and a third of rural households. These households are even less likely to be reached by male extension workers (Fortmann, 1986).

Extension services and forestry information rarely reach women, since these services do not typically recognize women's importance in forestry. The extent of sex-biased access to forestry services where extension is oriented toward a male-clientele is sparsely documented. Studies of forestry extension's impact typically do not distinguish clients by gender. Several studies do show that extension agents rarely visit women. For example, Fortmann (1981) cites that in the Morogoro region of Tanzania extension agents visited 58% of the men participating in a project yet only 20% of the women.

Ashby (1981) lists a number of cultural and policy reasons which account for this lack of contact by extensionists with female farmers. First, social constraints on male-female interaction in many societies inhibit women's contacts with unrelated members of the opposite sex, including male extension agents. For example, Jansen (1986) states that in Papua New Guinea, it is a cultural taboo for expatriate males to provide extension services to women. In parts of rural Nepal, women will not even speak to men from outside their community, and most of their conversation is with other women (Stewart, 1984). Second, where women's work is largely in the subsistence food crop sector, they are less "visible" to extension services concerned with commercial crop production. Third, female farm managers whose husbands emigrate to seek work are most likely to be low-income, and thus least likely to be sought out by extension services following a "progressive farmer" strategy. Fourth, extension staff, even if aware of women's forestry activities, often have the western view of male farmer systems, and thus do not actively seek out contacts with women farmers. Fifth, beliefs that women are technically incompetent impede communication between male extension workers and women. Therefore if women are to benefit from forestry information they must rely on their husbands for that information. However, since traditional barriers to communication between sexes prevail in many cultures, men may not be reliable transmitters of information either to or about women

(Ashby, 1981). Reliance on indirect communication runs the risk that the information may not be transmitted accurately. This is particularly important because women often implement the decisions their husbands may make on the basis of the extension agent's advice (Fortmann, 1981:210).

The most effective extension agents are those who are most like their clients in all respects except for technical competence about the recommended innovation. Agarwal (1986) mentions the feelings of one Filipino peasant about the qualities of an extensionist "change agents should be like waves on a sea; made of the same water, but which rise up above the water according to the needs of the situation and merge into the water again when the need is over." Extension success is positively related to homophily with clients (Rogers, 1983: 324) individuals tend to seek information from peers particularly when adoption entails uncertainty and economic risk. The trustworthiness of the information source is greatly enhanced if the potential adopters see the communicator as sharing their situation. Therefore in order to provide women with equal access to forestry information current extension staffing patterns could change, in some situations, to include trained female workers.

Women are perhaps the most effective communicators of new information to other women. In many places, this principle is enforced by cultural prohibitions or restrictions on interactions between men and women other than spouses. Given that the best way to spread information and ideas among village women is undoubtedly by direct contact, a female village-level worker can be a great asset.

Another question is whether formal education should be a necessary criterion for female agricultural extension staff. The evidence that formal education of extension field workers enhances their effectiveness is inconclusive. Increasing the technical training of an extension agent does not necessarily lead to her improved performance, measured as the client's adoption of innovations.

In fact, lower performance often results, contrary to conventional wisdom, because the increased professionalism of the extensionist creates a wider heterophily gap with the clients (Rogers, 1983:324). Some studies indicate that more highly educated extension workers are less effective in promoting innovations since the more educated tend to have urban backgrounds and view farming as an inferior occupation. Technical expertise may not be the most important quality of an extension agent in the eyes of the users. Personal acceptability of the agent may be as important, or even more important, than technical expertness (Rogers, 1983:325).

Unfortunately the budgets of most developing countries cannot be expanded to provide for more trained female extension agents. Even if they did have the funds, not enough professionals exist in the countries, and it would take years to train women. One possible solution to the lack of female extension agents is to incorporate more paraprofessional aides. An aide is a less than fully professional change agent who intensively contacts clients to influence their innovation decisions (Rogers, 1983:325). One

of the most important advantages of aides is that there is much lower cost per client contacted. Besides the advantage of costing less, paraprofessionals are socially closer to the lower-status members of the user system that they serve. Women aides who themselves are farmers will be perceived as a peer, although a peer who has received some specialized training. Women with little schooling and even illiterate women have been trained as field aids and found to be effective in a number of large-scale extension programs (Rogers, 1973).

Women's groups

One approach to integrating women into forestry extension is to graft extension activities onto existing women's groups. Women's groups can play an important role in mobilizing local support, disseminating information, legitimizing proposed changes, and reinforcing participants' motivations and commitment to change. Women's groups provide a social context for peer-group support in decision making and mobilization for action (Ashby, 1981).

Piepmeyer (1980) noted that the peer group support, common among women who are members of segregated role relationships, has contributed to the emergence of strong women's organizations in developing countries. This female peer group support is not as common in the west. Its potential as a mechanism for improving women's status and political participation and also for enhancing general development could be overlooked in forestry projects if they are based on western models.

Also, group activities are efficient where extension staff are responsible for contacting a large number of individual clients in the face of manpower and financial constraints. An active women's group can enhance the effectiveness of extension services and may generate local organizational capacity to make demands on central planning agencies and to sustain programs that outside agencies initiate.

For several reasons women's groups are directly relevant to the impasse created by the culturally inappropriate model of extension. First, it is generally known that persuasive communication takes place more effectively in groups than it does between individuals. Secondly, the overwhelming majority of extension agents are male, but in some countries it is awkward for a man to visit a house where the husband is away. Since there are no inhibitions on men working with women's groups, this is an extra incentive for group extension. Thirdly, women's groups are quite common in many countries and have come to play an exceedingly important role in development.

The advantage of extension work with groups does not lie solely in the fact that a single extension agent can reach many clients simultaneously. Groups are potentially capable of acquiring a powerful influence on the individual judgment of their respective members. The extension agent could consciously use this influence in getting the participants to adopt new practices. This kind of influence is likely to develop, however, only if the group size is small enough to allow close ties among the individual members. Groups are most influential when they have a high degree of

solidarity, the possibility of which is increased among smaller groups. Based on their studies in Kenya, Muzaale and Leonard (1985) suggest that groups with eight to 20 members are the most suitable for extension purposes.

At times using women's groups as vehicles for extension can alleviate the problem of a shortage of women extension agents. In Kenya a lack of women extension agents forced the government to use male extension agents to teach nutrition to women in groups. Muzaale and Leonard (1985) studied the effectiveness of this arrangement and concluded that the sex of the extension agent is not a barrier to work with women's groups on most issues. Male staff had no trouble interacting with the groups and frequently were quite enthusiastic about working with them.

Different models to education and training

In response to the weaknesses of the diffusion model, communication scholars and educators have developed theoretical models which encourage more active participation of the future innovation adopters. These can be easily adapted to reduce the sex-bias in the diffusion of innovations model.

Brazilian adult educator, Paulo Freire, has suggested an alternative approach to education that claims to not only change attitudes, impart knowledge and modify behavior, but also to challenge unjust social structures (Freire, 1970). Freire's pedagogy stresses that social structures limit people's perceptions, thereby reducing the possibility of acting to change that reality. Freire proposes to abolish the "transmission mentality" in education and communication, and replace it with a more liberating type of communication that would contain more dialogue and would be more receiver centered and conscious of social structure.

Arguing that oppressive elites use conventional education models – schools and non-formal education systems alike – to dominate the powerless, Freire (1970) posited an alternative based on the notion of "conscientization." Simply put conscientization means "to make aware" or "awakening of consciousness" or "critical consciousness." More precisely, Freire defines as conscientization as "the process in which men, not as recipients, but as knowing subjects, achieve a deepening awareness both of the socio-cultural reality which shape lives and of their capacity to transform that reality" (Freire, 1970:27).

Freire claims that technification (adoption of technical innovation) without conscientization renders the peasant more dependent on forces she does not understand. Conscientization helps the learner look at problems with her own eyes. She is helped to penetrate the "ideological mist" imposed by the dominant class which blinds her eyes, and to see the existing situation in which the structure and culture of her society keep her from realizing her own aspirations and participating in her own destiny. By "problematizing" her situation, the learner naturally looks for a way out. This she finds through association with others and through the use of "cultural tools" for "liberation" such as political participation, social class organization, literacy, school and cooperatives.

The problem of development according to Freire is not ignorance, inadequate technology, or social disorganization, but rather the domination of people's consciousness by untruth and false perceptions of reality. The oppressed and dominated minds look inward and decide that they are unable to cope with their misery; they are impotent, the situation is hopeless and nothing can be done to change this objective reality (Freire, 1970). Given the impossibility of transforming this reality, the only option left is to adapt oneself to the situation, remaining silent to injustice, and internalizing the viewpoint of the society's elite that the cause of this condition is the oppressed's own inherent inferiority.

Unlike the extension/diffusion theorists who reduce the educational process in social change to the mechanistic transfer of knowledge and technology, Freire moves beyond changes in knowledge, attitudes and behavior to deal with the underlying structural problems of a society that prevent certain groups from achieving their full potential. Freire calls the concept of education where knowledge is seen as a gift deposited in the minds of the learners "banking education" (Freire, 1970:58).

Havelock (1971) suggests an alternative he calls a "linkage model," that combines the strongest features of the research, development and diffusion, the social interaction and the problem-solving models of innovation, dissemination and knowledge utilization. Linkage is a series of two-way interaction processes which connect user systems with various resource systems including basic and applied research, development and practice. The resource systems must appreciate the user's internal needs and problem-solving patterns; and the user must be able to appreciate the invention, solution formulation and evaluation processes of the resource systems. This type of collaborative interaction will not only make solutions more relevant and effective will build relationships of trust and mutual perceptions by user and resource persons that the other is truly concerned, will listen, and will be able to provide useful information. These trust relations over time can become channels for rapidly, effectively and efficiently transferring information. The linkage model draws heavily from the problem-solving model which stresses the need for a diagnostic stage which analyzes and interprets the users' needs, gives importance to the use of internal resources and reflects the belief that "user-initiated change is the strongest."

This orientation rests on the primary assumption that innovation is a part of a problem-solving process which goes on inside the user. Problem-solving is usually seen as a patterned sequence of activities beginning with a need, sensed and articulated by the client, which is translated into a problem statement and diagnosis. When she has thus formulated a problem statement, the client-user is able to conduct a meaningful search and retrieval of ideas and information which she can use in formulating or selecting the innovation. Finally the user needs to concern herself with adapting the innovation, trying out and evaluating its effectiveness in satisfying her original need. The focus of this orientation is the user, her needs and what she does about satis-

fying her needs. The role of outsiders is therefore consultative or collaborative. The outside change agent may assist the user either by providing new ideas and innovations specific to the diagnosis or by providing guidance on the process of problem-solving at any or all of the stages.

Advocates of the problem-solving approach generally stress five points:

- first, that user need is the paramount consideration and the only acceptable value-stance for the change agent;
- second, that diagnosis of need always has to be an integral part of the total process;
- third, that the outside change agent should be nondirective, rarely, if ever, violating the integrity of the user by placing himself in a directive or expert status;
- fourth, that the internal resources, i.e. those already existing and easily accessible within the client system, itself, should be fully utilized; and
- fifth, that self-initiated and self-applied innovation will have the strongest user commitment and the best chances for long-term survival (Havelock & Havelock, 1973: 8-9).

The linkage model retains many of the fundamentals of the problem-solving model but differs with respect to the role of outsiders. Havelock (1973) argues that the user must enter into a reciprocal relationship with the resource system. This means that in order to derive help from resource persons, the user must be able to simulate resource system processes. Likewise resource systems need to develop reciprocal and collaborative relationships with clients and must simulate the needs and problems of the user. This at times means "getting into the skin" and truly identifying with the client which is no small feat. By using the linkage model, development specialists can better understand the women's situation and her communication channels with her fellow women. It could also aid in determining how women diagnose and solve problems and how they solicit external assistance when necessary.

Kearl (1976:177) argues that the Havelock model is extremely difficult to apply in agricultural development since "decisions about the allocation of human and other resources usually emerge from national goals that, initially at least, are as likely to consider the preferences of the rural family an obstacle to be overcome as an end to be satisfied." Whereas Kearl's comment may apply to some authoritarian governments, many developing countries do indeed place the needs of rural families high on their priority list. Some governments may actually promote a Havelockian approach to problem solving since it lessens the need for government intervention as rural people help themselves rather than relying on the government.

Maurer (1981) applied the Havelock model to a poultry project in Nicaragua. Although the project never reached the adoption stage due to revolution, Maurer maintains that the model could be effective. She proposes that the Havelock user-oriented model be modified to include consideration of the importance of government sanctions of a development project.

Chapter Three: Setting

General aspects of the zone

The county of Hojancha is located in northwestern Costa Rica on the peninsula of Nicoya. The county, which encompasses an area of 230.5 km², stretches from hills at 800 meters to the Pacific coast. The county has a population of 9,193 inhabitants. Of these 93% are located in the rural sector while 78% of the labor force works in agriculture (Dirección General de Estadística y Censo, 1981).

The primary agricultural activity of the zone is cattle ranching. In the county 78% of the land is used as pasture, 9% for annual crops, 2% for permanent crops and 11% in forests (Dirección General de Estadística y Censo, 1973). The principal crops of the zone are rice, maize, and beans. To a lesser degree farmers cultivate fruits, vegetables, coffee, sugar cane, and plantain. Hojancha is characterized as a zone of medium-sized properties – or for the lack of latifundios or minifundios. In the county 35% of the farms measure less than 50 hectares, which equals 48% of total area. This fairly even distribution is due to the rugged terrain which impedes concentration of land holdings (Figure 1).

Agrarian trends

At the end of the 1920s, especially in 1928, many people left Costa Rica's Central Valley because of its population pressure and the world depression and migrated to the peninsula of Nicoya. The population of Hojancha grew greatly since the large majority of these emigrants worked in agriculture (UNA, 1986a).

Until the 1950s, the peninsula of Nicoya was nearly entirely dedicated to crop production. However at the end of the 1960s and the beginnings of the 1970s the price of beef rose. This caused a great transformation from crops to cattle ranching. During this time farmers cleared the greater part of the residual forest and created pastures. Since cattle ranching requires less labor, the unemployment rate rose, thus causing many people to leave the area. The unemployment rate is particularly high during the dry

season and forces many landless and poor farmers to become migrant workers for up to four months.

From 1963 to 1973 the area in permanent pastures rose from 50% to 70% of the total area of Nicoya and Hojancha. The cultivated area diminished from 22% to 10% and the number of animals rose by 63% (UNA, 1986a). The rise in land prices caused many small farms with little capital to have severe difficulties and forced many of them to sell their land to a small number of cattle ranchers. This concentration of land caused a great wave of emigration from the area not only of small farmers but also of landless peasants.

By progressively substituting crop production for cattle ranching producers demonstrate their interest in production per work day (extensive) rather than production per hectare (intensive). The historical development of the region shows us that the majority of the producers selected the activities that permitted them to earn more per work day, or rather maximize the remuneration of their own work.

Cattle ranching doesn't produce very high profit margins, but, since it requires little labor per unit of land, it provides a greater remuneration per work day than working in basic grains. This concept is fundamental to understanding the near absolute transformation from crop production to cattle ranching.

The majority of the cattle ranchers have little interest in intensifying. When they invest their discretionary income, it is usually to buy more land. This trend has had a strong impact on the area's development: the elimination of the forest in a few decades, the progressive concentration of the land and consolidation of farms, and the expulsion from the area of small farmers who sell their land since they can no longer produce using slash and burn methods. The process of transformation differed slightly in Hojancha than from the rest of the peninsula as mentioned above (UNA, 1986b). The evolution of land tenure in Hojancha between 1930 and 1960 was such that the process of land concentration was not as important. Capital that was generated wasn't invested into land (since there was none available for sell) but was used to intensify. Technification of traditional activities and an orientation toward new production systems that generate greater gross margins per hectare increased. In these zones the majority of producers have interest in intensification. The transformation to cattle ranching created a strong decrease in cultivated areas and production of basic grains for the farm family's consumption. The transformation also caused the relative intensification of the little crop production that was left such as the use of oxen in level areas to eliminate weeds; diffusion of fertilizers beginning in the 1960s; limited use of herbicides and insecticides; and mechanization with tractor.

During 1975-76 the international price of beef fell causing many farmers to go into debt and to sell their farms. Toward the end of the 1970s the area had high rates of unemployment and



Figure 1. Panoramic view of Hojancha county.

emigration and showed possible trends toward land concentration. It was one of the few counties in the country selected in 1976 for the integrated rural development project.

The farmers of the zone decided that one of the components of this project would be reforestation. They were sensitized by recent burns and drought and the general lack of trees in the county. They created a community tree nursery which was administered by a forestry committee.

Communal organizations

The people of Hojancha have shown strong inclinations toward working together in formal and informal organizations. Some of the organizations are described below:

County Agricultural Center of Hojancha (CACH)

The county agricultural centers were created in 1969 to help develop and improve communities through their participation in planning and carrying out development programs. The CACs are composed of a member of the municipality, a delegate of the rural junta for agricultural credit or another representative designated by the national banking system, four farmers representing the various agricultural activities of the county and two persons of proven interest in agricultural improvement and rural welfare. The CACs administer financial resources through dues paid by members, donations or subsidies, sale of its goods, and government subsidies.

The CAC in Hojancha was founded in 1978. One of its first projects was to continue and extend programs that were initiated by IFAM/AITEC. It continued the forestry project which was begun in 1977 and administered the forest nursery that was established with the assistance of the General Forestry Directorate (DGF). CACH works mainly in agricultural diversification, soil conservation and reforestation. It operates a tree nursery, a milk collection center, a model farm, a pork reproduction center and a coffee growers' development center (Figure 2).



Figure 2. The facilities of CACH in Hojancha.

Association of Integrated Development

This association was established in 1975. In 1984 the association had 220 members and a board of directors that meets every two weeks. Some of its objectives are to promote the economic, social and cultural development of the community and to stimulate and promote training courses for women in the home.

COOPEPILANGOSTA

The Cooperative of Coffee Growers, COOPEPILANGOSTA, was founded in 1962 to respond to the problem of coffee marketing that small farmers in the area experienced. The cooperative now has a coffee mill which buys coffee from the farmers and sells it through the Federation of Coffee Growers' cooperatives. The federation offers, through COOPEPILANGOSTA, technical assistance to all coffee growers in the region, regardless if they are members. Since its creation it has collaborated with national and local institutions to promote coffee growing in the region. The cooperative has 212 members and has created a store of agricultural goods and a gasoline station.

Cattle Ranchers' Chamber

The region has a branch of the Cattle Rancher's Chamber of Guanacaste. This organization suggests and regulates the commerce and the exportation of cattle and also obtains some basic inputs like salt.

Reforestation projects

As indicated previously one of the mandates of the integrated rural development project was to promote reforestation in Hojancha. In the ten years since the pilot rural development project's inception several reforestation projects have established activities in the zone. Program for the Conservation of Natural Resources (CORENA) in September 1979 the Costa Rican government signed an agreement with USAID to finance a program for the conservation of natural resources (CORENA). One of the five projects of the program is the management of the Nosara River upper watershed project. The project was designed to gain experience in carrying out agricultural programs and managing credit incentives as well as to test new management practices. The project has four major activities: 1) update the basic studies and the master management plan; 2) reforestation; 3) soil and water conservation; 4) extension assistance.

Fuelwood project and Madeleña

The fuelwood project and Madeleña form part of a Central American project with funds from the regional office of USAID for Central America and Panama and administered by CATIE through national institutions. The fuelwood project began in Hojancha in 1981 and terminated in 1985. The follow-up Project Madeleña began in 1986 and will continue through 1990.

The fuelwood project's principal mandate was to experiment with various species to select those that are most promising in the area. The tree crop production project (Madeleña) is the second

phase of the fuelwood project whose purpose is to develop and strengthen the capabilities of CATIE and public and private forestry services, educational institutions and extension organizations to market tree crop technologies for the use and economic benefit of small- and medium-sized farmers and rural industries. In Costa Rica, the project works with the forest service (DGF) (Figures 3 and 4).

IAF/CACH/CORENA forestry project

In 1977 CACH began a forestry project to counter the rapid pace of deforestation and overgrazing in order to normalize the water cycle, diversify the use of the farm, and generate employment. The first step was to establish a community tree nursery for

timber and fruit trees (Figure 5). At first the nursery used exotic species such as Honduran pine (*Pinus caribaea* var *hondurensis*), cyprus (*Cupressus lusitagica*) and eucalyps (*Eucalyptus camaldulensis*). Due to farmers' apathy toward tree planting the nursery recorded a loss of 50% on its initial production. Farmers would take five to 10 trees to plant them in their gardens. They didn't see the tree planting as a potential large scale activity nor profitable. Their reaction was logical since they were the same people who arrived to colonize the zone and who cut and burned the forest. It was unheard of for these men to be told by some youngsters that they should reforest the very slopes which they had so painfully cleared.

In 1979 CACH developed a forest demonstration plan that included contracts with farmers. This was a key step so that the farmers would initiate the tree planting. During its first years CACH created a number of agreements with farmers to establish plantations. The farmers would provide the land while CACH would plant the trees and manage the plantation. The profits were divided 60% for CACH and 40% for the farmer. Thirteen hectares were reforested in this manner.

Actually contracts were signed for only five of the 13 hectares. Farmers would volunteer their land without the formal agreement. This illustrates that when the people value something, they need neither rules nor regulations.

The farmers of Hojancha now express a constant and strong desire to reforest. These farmers recognize the environmental value of reforestation as well as the economic value. Many of these farmers attribute water scarcity, higher temperatures, lower productivity, and timber and fuelwood scarcity to the massive deforestation that has occurred in the zone. Nevertheless, although there has been a great deal of interest in reforestation, most farmers are unable to reforest without credit.

In October 1984 the Inter-American foundation (IAF) and CACH signed an agreement to conduct a forestry project with a duration of four years. The project aims to reforest 250 hectares in Hojancha county and includes promotion activities, extension and training. Fifty of the hectares will be planted under the type of contract previously specified where the farmer and CACH split the profits. The remaining 200 hectares will be planted as plantations that belong to the farmer. The three species



Figure 3. A demonstration plot of one-year-old *Gmelina* established by the Madeleña project.



Figure 4. Hojancha farmers inspecting *Gmelina*.



Figure 5. An irrigated tree nursery.



Figure 6. A farmer inspecting teak at a CACH nursery in Hojancha.



Figure 7. A teak plantation which is part of the CORENA project.

most commonly used are *Gmelina arborea*, *Bombacopsis quinatum*, and teak, *Tectona grandis* (Figure 6). CORENA provides the funds necessary for the reforestation. By 1987, 56 farmers had received a total credit of 5.2 million colones and had reforested 130 hectares.

Now the forestry project is the strongest component of CACH. It consists of:

- A credit committee, which consists of three farmers, a delegate from the bank and a delegate from the DGF who study and approve or deny farmers' requests;
- An advice committee consisting of four foresters who work without pay for CACH in directing the orientation of the forestry component;
- A demonstration farm that shows the integration of trees in certain production systems and where farmers can receive technical assistance (Figure 7), and;
- A post treatment plant, a charcoal oven, a wood depository, and a portable sawmill. CACH has fulfilled a double function: it has assumed productive and cooperative functions, generating its own resources thus assuring its survival and it has served as a promoter of reforestation by channeling funds from other projects (e.g. CORENA) to individuals or organized groups.

According to the foresters of the zone, the following factors spell out the reason for success and continuity of the program:

- The growing scarcity of tree cover in the region and the farmers' realization of its detrimental consequences;
- The presence of young leaders from the same community who have agricultural and forestry training who push the project;
- The lack of a preconceived concept of how the forestry component should function, and;
- The permanent participation of the farmers of the region (von Dam, 1987).

Chapter Four: Methods

Objectives of the study

This study is a micro-level case study of a region in Costa Rica that is implementing various reforestation projects. The purpose of the study is to examine the possibilities of integrating women into these reforestation projects in order to foster greater reforestation rates, augment family income, and promote greater egalitarianism in development projects. The study takes a participatory communication approach to project design based on the tenet that the clients should be the starting point, center and end goal of any development project. The study attempts to:

- Identify what forestry-related activities women now partake in;
- Identify the constraints to their participation in future activities;
- Identify the activities that would be most suited for them;
- Identify possible strategies to integrate women in reforestation projects;
- Test a survey methodology.

In order to derive this data I conducted a survey and three case studies.

Site selection

I elected to study the women in an area that already has an active reforestation project so that the data could be directly used by the project. Selecting a study area where a reforestation project is currently underway is of great importance. The division of labor no doubt varies greatly throughout Costa Rica due to geographic, cultural and religious influences. Women in one region of the country may be very enthusiastic about planting trees whereas in another region they may have little interest. The recommendations made for one group of women may not apply to those in another area. A second reason for choosing the site was that I had worked in Hojancha and was quite familiar with the setting.

Survey

Questionnaire design

The original questionnaire design was based on the Chaffee-McLeod Co-orientation model (McLeod and Chaffee, 1973) (Figure 8). By using the model we could compare the men's and women's orientations on types of fuelwood preferred, types of trees to plant, uses of trees, etc. The questionnaire consisted of various ranking questions and multiple responses (Appendix 1).

Pre-test

We tested the questionnaire on four families – two landed families, one landless family, and one woman-headed family (Figure 9). After the pre-tests I decided to make a number of modifications in the original questionnaire.

We decided to eliminate landless families from the sample, primarily because the questionnaire was directed toward participation in tree planting – an activity which requires land.

We recognized the importance of including landless families in similar studies, but we decided that the approaches to integrating landed and landless families into forestry projects were quite distinct and would require separate studies.

I also modified the co-orientational analysis, eliminating the “accuracy” and “perceived agreement” measures and focusing only on actual agreement or overlaps in the perceptions and views of men and women. It would be useful to communication planners to know whether husbands and wives are aware of the extent to which they agree or disagree on forestry issues. However, our respondents were put off by such questions as “how do you think your spouse would respond on this issue?” They could not see the utility of such questions, and many responded by reminding us that the spouse was, after all, being interviewed, and that if we wanted to know what he/she thought we should ask him/her. This was an understandable response, and in the face of it we chose not to engage in lengthy explanations or attempts to persuade, and opted for working with agreement data as an indication of intra-household communication on forestry issues.

Third, I amplified my focus on identifying women's fuelwood needs and preferences to include women's present and potential participation in forestry activities. My preliminary data showed that women are involved and interested in forestry activities. Yet

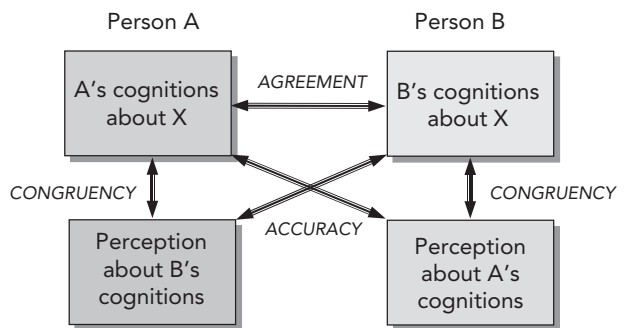


Figure 8. The McLeod-Chaffee Co-Orientation Model. The test for ‘accuracy’ was removed for this study.



Figure 9. Conducting the pre-test.

the planners and implementors of reforestation projects have rarely made strong efforts to include them in their projects or seek information concerning their needs and preferences. I suspected that the rate of adoption of forestry innovations and practices could be increased by including women. Therefore, I decided to focus not only on needs and perceptions, but also on the activities which women now participate in, the activities they would like to participate in and the constraints which impede their participation.

Sample selection

I decided to use as a sample area the upper watershed of the Nosara River since CORENA used the same area and I could rely on much of the socio-economic data that they accumulated during the project. I also chose the watershed because it is the hub of the Madeleña and CACH reforestation projects. CORENA produced a land tenure map of the watershed and had the names of all landowners. From this map I randomly selected 66 households out of the total of 92 households. The criterion determining the sample was to use small landowners in the area where a woman lived in the household. I included woman-headed households, but excluded landless families.

Data collection

We collected the data the week of 17 to 21 August 1987. I used six interviewers to conduct the survey – three men and three women. The men included a Madeleña forester, an anthropologist and myself (Figure 10). The women included a forestry extensionist and two foresters that were hired solely for the survey (Figure 11). On the first day of the week of interviews, I briefed the interviewers about the study and trained them in basic questioning techniques. Before beginning the survey we had a role-playing session and discussed any difficulties that might arise during the questioning. I divided the six interviewers into three teams – a man and woman in each team – and assigned each team a vehicle. I divided the 66 households among the three teams and allowed

them to plan their routes. In this manner we were able to conduct five to seven interviews per day. Many times we did not find the man and woman at the household together and therefore made appointments to return later.

Upon arriving at a household we explained who we were and the purpose of our visit. We then separated the man and woman and conducted simultaneous interviews in different parts of the house. I instructed the interviewers to conduct informal, unstructured interviews with various probing questions and to use the questionnaire merely as a guide to questioning. The interviews lasted from a half hour to one hour. In nearly every case, the women finished before the men. At the end of each day, we met to discuss some of the data we had obtained. At week's end, we also met to further discuss our interviews and make some general conclusions and recommendations.

Data analysis

I analyzed the survey data using the statistical package for the social sciences (SPSSX) release 2.1 On a WIRCS/VAX system at the Madison Academic Computing Center. I ran tests for frequencies, t-tests, paired t-tests, McNemar paired tests, cross tabulations, and chi-square.

Case studies

The case studies were particularly useful in gathering “how” and “why” data, when the investigator has little control over events and when the focus is on a contemporary phenomenon within some real-life context. The case study's unique strength is its ability to deal with a full variety of evidence – documents, artifacts, interviews and observations. Case studies have at least four applications (Yin, 1985). The most important is to explain the causal links in real-life interventions that are too complex for the survey or experimental strategies. Second, case studies are helpful in describing the real-life context in which an intervention has occurred. Third, an evaluation can benefit, again in a descriptive mode, from an illustrative case study – even a journalistic account



Figure 10. Male interviewing husband.



Figure 11. Female interviewing wife.

– of the intervention itself. Finally the case study may be used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes.

In this study the survey helps to determine the extent of women's interest and the constraints and possibilities. The case studies complement the survey data by adding information about their potentials and capabilities. They provide insights not so much into what is generally true of women in forestry, as into what is possible when special efforts are made to overcome constraints. In a sense the case studies are the "proof of the pudding" – evidence that women can and do participate effectively when circumstances permit.

During a preliminary visit to Hojancha I decided that I would need considerable qualitative data in order to make any conclusions regarding the integration of women into forestry projects. After consulting with the project officials I identified three possible case studies in the area. The first was COOPEMA-TAMBU, a women's cooperative that manages a small bakery.

In order to meet their fuelwood supply the women planted a one-hectare plantation of *Gmelina*, a fast-growing exotic tree widely promoted in the area. I also chose to conduct a case study on a division of the Asociación para la Promoción de la Mujer en Monte Romo. A group of 11 women have established a number of tree nurseries and sell the seedlings to local farmers. I chose to study these groups and elaborate on their success or failure, relations with government and private organizations and projects, constraints, access to technical assistance and credit and characteristics of members. In addition, I identified a 60-year-old woman who collects and sells *Gmelina* seeds.

I initially made contact with the leaders of the groups through Madeleña's forester in Hojancha. I subsequently travelled to the homes or parcels of the women for further interviewing. I obtained the data for the case studies primarily through interviews with the women in the group and with the project managers. I also obtained considerable data reviewing reports and other published data and using observation techniques.

Chapter Five: Results

Case studies

COOPEMATAMBU

Although located only five kilometers from the municipal center of Hojancha, the indigenous community of Matambu has many distinct characteristics and does not follow the agrarian pattern of the rest of the county. Matambu is characterized by its moderate slope, high population density (approximately 100 people/km²) and very small farms (two to three hectares). The most common production system is manual sowing of basic grains with few inputs and a limited number of animals such as one or two pigs and a few chickens. The origins of the Matambu community are unclear. Although the community has been declared an indigenous reserve, the degree to which they are indeed Indians is debated. Not all of the people of the community nor of the nearby communities agree that they are Indians (Bozzolli, 1975). Nevertheless they do maintain strong Indian facial characteristics and some activities such as the fabrication of ceramics. During a town meeting and subsequent conversations, I noticed that those with whom I spoke clearly identified themselves as indigenous people.

Unlike other communities Matambu was well-structured during the migration wave from the central valley during the 1950s. Perhaps due to this and its high population density its production systems were not transformed like other Guanacaste communities where the original inhabitants and production systems were replaced. In Matambu a marked process of social differentiation has not been produced and the dominant characteristic is small farms oriented to crop production (basic grains). Given the small size of their farms, farmers of Matambu did not develop cattle ranching.

Due to this small farm size, the farm cannot support the entire family. Contrary to other zones where children collaborate in farm activities, in Matambu there is not enough work. Many children temporarily migrate to other zones of the country in order to secure jobs. During the 1970s many people from Matambu migrated. However now, according to one community leader, the emigration rate has dropped. Before a farmer would abandon his land thinking it was infertile. But now with better production techniques they are making their land more productive. These farmers, whose limiting factor is the amount of land available, are quite open to intensification.

Many community members complain of the unequal distribution of land. They argue that many of the "white people" have bought up much of the land.

Creation of group

Traditionally the women of Matambu have been economically active. Many women sell corn products, fruits or small animals in nearby markets. One member of the community, Don Victor Manuel, noted that the women were travelling too much and too far and selling their produce too cheaply. He visited many of the

women and suggested that they organize themselves. Don Victor Manuel proceeded to organize a meeting with the women to discuss the possibility of creating some type of women's organization. Thirty-six women appeared at the meeting. During this time, the organization was an informal women's group. But in May 1984 they made the group into a *sociedad anonima*. After a short period many of the women became disillusioned and left the organization. By the time they formed the *sociedad anonima* only 14 women remained in the group. Most quit since they were not accustomed to working with groups, were quite old or thought it was too much work. Don Victor, who at the time was a municipal alderman, suggested that they make a proposal to CODESA for a loan. Victor suggested they go through CODESA since he heard of them through another project. The women contacted CODESA who in turn suggested they construct a bakery since at the time none existed in the area. CODESA accepted their proposal, offered them a loan of 300,000 colones in order to construct the bakery and promised them some type of transportation. Under the terms of the loan the women were given a one-year grace period with 12% annual interest and were required to make monthly payments of 6,000 colones. The women started building their bakery in August 1984 and finished in January 1985 (Figure 12, 13 and 14). According to Don Victor Manuel the women worked hard and admirably to construct the building. Whereas skilled labor did most of the work the women helped when they could in activities such as hauling sand. Shortly after they completed the bakery the women suffered their first misfortune: their stove collapsed. The women blamed it on CODESA engineers and broke off with CODESA and borrowed only 240,000 of the promised 300,000 colones. Because of the collapse of the stove the women have temporarily suspended payment on the loan until the matter is resolved. The social service office (IMAS) donated 30,000 colones to the women to buy a corn mill. However the mill sits in the bakery unused since they there is no electricity in Matambu.

They women received a six-hectare plot of land from IDA. They planted this with corn which they would sell and use in



Figure 12. The COOPEMATAMBU bakery.

their baked goods. They lost almost their entire first crop due to the drought. The group was getting poor support from the community since the *sociedad anonima* status made them look like a profit-making organization of little value to the community. Therefore on 2 February 1985 they formed a cooperative called COOPEMATAMBU R.L. and became federated with the National Institute for Cooperative Promotion (INFOCOOP). INFOCOOP gave them talks for eight months on administering coops. The co-op follows the standard guidelines of all co-ops. They hold meetings every two weeks and a general assembly once a year. Currently there are 12 members in the co-op. They have closed the group to new members since there is very little work to do and many debts to pay. Normally the women will work two to three days per week from seven in the morning to two in the afternoon. If someone can't work during their assigned time they must send a substitute or receive a pay reduction.

Establishment of forest plantation

The cost of providing fuelwood for the oven began to greatly reduce the women's profit (Figure 15). They were paying 500 colones per cart and buying about 24 carts a year for a total of 12,000 colones annually. Therefore the women decided to establish a forest plantation and produce their own fuelwood. They did not see the plantation only in terms of fuelwood but also as a future investment given the value of the timber and for conservation



Figure 13. The COOPEMATAMBU bakery.



Figure 14. The COOPEMATAMBU bakery.

purposes. They bought a three-hectare plot adjoining the bakery for 240,000 colones (Figure 16). The money for the land came from following sources: CONAI 120,000 colones; the French aid mission, 100,000 colones; and the women themselves 20,000 colones. On 3 July 1985 they planted 1700 trees on one hectare of the three-hectare plot. The group planted the fast-growing exotic *Gmelina arborea*. None of the women had ever used *Gmelina* as fuelwood. When asked why they chose the tree they said because



Figure 15. The COOPEMATAMBU bakery required great amounts of fuelwood for the oven.



Figure 16. The COOPEMATAMBU *Gmelina* plantation.

it grew fast and because a forester recommended it. The forestry projects in Hojancha are widely promoting *Gmelina* plantations because of its fast growth and multiple use. A plantation will reach harvest stage in 12 years. Among its multiple uses are timber, fuelwood, telephone poles and fence posts. The women have encountered no major problems in managing the plantation. Local foresters have been quite impressed with the growth of the plantation and the women's care of it. The administrator of CACH says on a scale of 0 to 100 he would give the co-op's plantation a 95. He says the women have taken excellent care of it and are always on top of its administration.

Technical assistance

None of the women had previous experience in managing a forest plantation. But they have received an adequate amount of technical assistance from various institutions. Before they established the plantation the co-op's general manager, Libia, participated in a three-day seminar for forestry promoters in April of 1985. The sponsor of the seminar, the CACH, selected leaders of communities who could possibly be local forestry promoters. Nine people were selected; Libia was the only woman who participated. The seminar covered such topics as erosion and deforestation, tree nurseries, plantations, forest utilization and CACH's credit program for reforestation. The participants were also taken to a number of field trips to plantations in the area and CACH facilities. The co-op relies on frequent visits by extensionists. A female peace corps volunteer working with CACH helped the women greatly during the plantation's initial phases. The peace corps volunteer, a forester, organized a field day at the plantation in February of 1986. Many of the women assisted and learned of thinnings, fuelwood utilization, use of the products of the thinnings, curing wood and chainsaw use.

The forest extensionist from CACH and the Madeleña forester also visit the parcel periodically. The co-op also has received technical assistance from the Institute of Agrarian Development (IDA), the national institute of learning, and the university of Costa Rica. The women feel that the technical assistance they have received has been quite adequate. Nevertheless as the plantation enters its third year they do express interest in learning more about thinning. Also they would like to know of other species besides *Gmelina* that they could plant of the remaining two hectares they own.

Credit

In 1985 the cooperative signed an agreement with CACH for credit based on funds from CORENA and IAF for reforestation. Under the terms of the loan the women would receive up to 40,000 colones per hectare that they would reforest at an interest rate of 8% and for a maximum period of 12 years. Although they were entitled to 40,000 colones they only took 32,000 since they didn't need the rest. Libia, the co-op's general manager, became the guarantor of the money. The women used the 32,000 colon loan to buy seedlings from CACH, buy fertilizers, pay labor to clear the

brush, and fix fences. CACH's administrator says the women are on schedule with the interest payments and that CACH has had no problem with the women.

Market/profit

Although the women have overcome great obstacles during their first two years, to date they have been unable to make the co-op a profitable venture. In 1985 their net revenue was 39,000 colones; in 1986 it was 43,000; in 1987 (until July) they had no revenue. They suffered a loss of 60,000 colones in 1986 when a drought destroyed their corn crop. Currently they have no capital to invest and are looking for further loans. In the summer of 1987 they were working very little in the bakery mainly because they had no transportation that was needed to market their goods in nearby population centers. Also a bakery was established in Monte Romo thus creating direct competition. The bakery in Monte Romo has a truck to deliver the goods. The women have considered hiring a taxi but feel this would greatly reduce their profits. They would prefer to avoid intermediaries which they feel is against the idea of co-ops. They are looking hoping to find someone who will donate a car to them. However none of them know how to drive. They hope that one of the co-op's younger members who is now studying in San José can learn to drive.

Members

1. Libia Aguirre. Co-op's general manager. 43 years old. Divorced. Head of household. Has one 13-year-old son and an adopted one-year old son. Has a small parcel, but doesn't farm it since it is full of rocks and she likes the trees. Her ex-husband gives her child support and she also sells pigs and chickens at the market. Elected manager because she isn't afraid to speak out in front of others.

2. Ilda Cortes Obregon. President. 23. Single. Three children. Gets financial help from mother and brother. Raises small animals. Wants to leave area, maybe to the banana zone.

3. Teresa Perez Perez. Vice president. 37. Married. Four children. Husband has a small piece of land. He is jealous and resists her participation in the co-op since he feels that a liberated woman will fool around.

4. Lucimilda Villagre. Secretary. 19. Single. No children. Supported by her parents. Now getting a high school degree in San José.

5. Rafaela Aguirre Mendoza. 1st vocal. 36. Married. Five children. Landless. Joined co-op because her family needed employment since they were without land. Husband supports her work in the co-op. He migrates to the Atlantic coast to work on banana plantations.

6. Desmasia Aleman. 2nd vocal. 29. Single, never married. Five children. Receives support from parents. Sells fruit.

7. Victoria Perez. President, vigilance committee. 57. Married. Twelve children. Husband has plot from IDA. Need extra income for number of children. Husband supports her participation in co-op. Doesn't participate much since she has poor eyesight.

8. Maritza Villagra. 16. Single. No children. Receives support from parents.

9. Concepcion Aguirre. 49. Married. Six children. Husband is Don Victor Manuel who suggested the creation of the group. Illiterate.

10. Marta Iris Aleman Perez. 19. Single, never married. No children. Now working in San José.

11. Margarita Villagre. 29. Single. Five children. Head of household. Homeless. Receives 2,000 colon monthly pension for children. Doesn't have parents. Very poor.

12. Diagnasia Porras Lopez. 24. Married. No children. Landless. Husband works with group.

Observations

Like most cooperatives COOPEMATAMBU has met a great number of obstacles during its formative years. But despite these obstacles the women have continued to work hard and are dedicated to their cooperative. Perhaps the greatest factor leading toward their relative success is the strong leadership by Libia Aguirre. Her contacts with outside institution have enabled the women to get a large number of the loans and donations. She is an intelligent, enthusiastic and motivated woman. Many people in the community criticize her for her domineering style and also suggest that all she has done for the cooperative is in self-interest. Whether this is true or not is irrelevant. It becomes apparent that without the strong leadership of Libia the group would not have survived for three years. Many of the women have become disillusioned the past year due to the lack of revenue and suggest leaving the cooperative. But many indicated that they will continue with the cooperative for the "sake of the cooperative."

The cooperative has met some resistance from the Asociacion de Desarrollo in Matambu. Libia claims that they are very "machistas" and Don Victor Manuel says that there was a communist in the association that was creating problems for the women. It appears that the association wanted to build a health center next to the bakery. The women fought the plan saying that it was inappropriate to have a health center with its ill people next to a bakery. There was a great deal of community division regarding the issue but in the end the center was not built. The association recently elected a new board of directors who have been more favorable toward the co-op. The division of the community between political party lines is quite strong and creates the basis for many of the conflicts between the community and the cooperative.

The greatest problems that lies ahead for the cooperative is to settle their transportation problem and open up new markets for the baked goods. Member enthusiasm is now quite low and the co-op must revitalize the enthusiasm by generating revenue. In 1988 the co-op can begin to thin their plantation and will be able to sell fuelwood and posts. Another minor problem the women face is the lack of electricity. They have several pieces of electricity-run equipment which could greatly increase production but until they get electricity they are forced to mill corn and knead dough by

hand. A potential problem could arise when the women begin to use the *Gmelina* as fuelwood. *Gmelina* is an exotic species and none of the women have used it for fuelwood. It's quite possible that it will not burn quite to the women's satisfaction and they will return to buying fuelwood.

There appears to be no strong gender-based problems with the cooperative. Although most women have children and houses to tend they find time to participate. "It's just a matter of organizing your time," Libia says. Likewise there appears to be no discrimination against the group by the forestry projects. The cooperative members have been quite content with the assistance they have received. And the forestry projects have been impressed with the quality of the work of the women. The administrator of CACH says they're hard workers, careful managers and anticipate well the problems they might encounter.

Asociación para la Promoción de la Mujer en Monte Romo

Antecedents

Although the principal agricultural activity in Hojancha is cattle raising, the declaration in 1980 of Hojancha as a coffee-growing region stimulated many farmers to plant coffee. Extensionists from COOPEPILANGOSTA promoted the planting of shade trees in coffee plantations. With the creation of new coffee plantations the demand for shade trees grew. Although CACH has a nursery in Hojancha it can not keep up with the demand. There are 15 private nurseries in Hojancha which produce 1.8 million seedlings. Nevertheless, most of these are for timber trees rather than shade.

Creation of group

Meanwhile, a group of women called the Association for the Promotion of Women in Monte Romo were looking for projects for its members. The association had groups of women working in a bakery and a small cafe. A Peace Corps volunteer, Michael Swisher, who was working in Monte Romo, suggested that the women establish tree nurseries as a possible project for those women interested. Eleven women joined the subgroup of the association to work in the nursery. Swisher, a forester, and some of the women went to COOPEPILANGOSTA asking for material assistance. At the meeting the cooperative promised them plastic bags for the seedlings, CATIE promised them seeds, the Ministry of Agriculture fertilizer and the Peace Corps a hose for irrigation. The Association of Development of Monte Romo lent an 1800 m² parcel of land next to the sugar mill to the women for their nursery.

Description of activities

In March of 1986 the group first planted 27,000 seeds of *Erythrina* sp., a commonly used nitrogen-fixing legume native to Costa Rica. Nevertheless, although *Erythrina* is widely accepted throughout Costa Rica and often touted as a miracle tree, the farmers in Monte Romo showed little receptivity toward the species. The

farmers would not buy the *Erythrina* partly because it was not native to the area and they did not have experience with it and also due to the poor quality of the seedlings which were infested by worms and were too tall. The women buried all the seedlings for lack of a market. After the failure of the *Erythrina* the women attained a list of farmers who had received credit from COOPEP-ILANGOSTA to establish a coffee plantation. They visited each of these farmers and asked which tree species they would prefer to plant. The majority of the farmers preferred guava (*Inga* sp.), a native fruit tree that produces excellent fuelwood. The group planted 8,260 guava trees (Figure 17 and 18). There was such a demand for the seedlings that the women sold all of the trees at three colones a piece before they reached the transplanting stage. To assure that the farmers would buy the trees the women attained their signatures. The groups works irregular hours up to four hours a day, usually in the mornings. Some of the women

enjoy the work saying that they have always been interested in planting things (Figure 19). Others complain of the hot sun and mud. All of them enjoy the opportunity to work with the other women. They appreciate the opportunity to get out of the house and chat with the other women. In April of 1987 four of the 11 women separated from the group to establish their own nursery. They claimed that it was too far to travel to the guava nursery and the distance interfered with their responsibilities at home. Therefore they established a 400 m² nursery for ornamental trees and shrubs such as roses, citrus and hibiscus on the land of one of the women. To date the women have not sold any of their seedlings, although CACH has suggested that it would buy some or all of them. In August of 1987 the group of seven women working with the guava prepared a 3,000 m² parcel of land for a nursery for pochote (*Bombacopsis quinatum*), a valuable timber tree. The activity is closely coordinated with CACH who provided the seeds and technical assistance and who promised to buy the seedlings. Currently 11 women work in the group, seven with the guava and pochote and four with the ornamentals. However the majority of the work in the guava plot is done by two sisters and in the ornamentals, two women do most of the work.

Technical assistance

Like the group in Matambu, the women of Monte Romo have received adequate technical assistance (Figure 20). Until May of



Figure 17. Nursery of guava (*Inga* sp.) managed by the Association.



Figure 18. Guava seedlings (*Inga* sp.) produced by the Association.



Figure 19. Nursery of guava (*Inga* sp.) managed by Association.



Figure 20. Association receiving technical advice on nursery practices from an extensionist from CACH.

1987 they received substantial help from the Peace Corps volunteer. A Madeleña forester often visits the nurseries and gives them considerable advice. Currently the CACH has taken a keen interest in the group. CACH has recently hired an expert in nurseries who will dedicate some of his time to providing technical assistance. In August of 1987 he visited both groups and gave them demonstrations in grafting ornamental trees.

Financial assistance

The group has had minimal needs for financial assistance. As mentioned earlier they received seeds, fertilizer, plastic bags and hoses from various institutions. The plots of land belong either to the women themselves or the association of development. The women have also received a temporary subsidy from the Ministry of Labor. By being a member of the group the women qualify for 4,000 colones monthly. Although the women would like to use these funds to invest in the nursery, they use it all for their families.

Market

According to the administrators of CACH and COOPEPILANGOSTA the market for tree seedlings is far from being saturated. Even though the local market may soon become saturated, they feel the seedlings can be marketed on a regional level.

Members

1. Edith Gonzalez Campos. 28 years old. Married. Three children (ages 2, 5 and 9). Father has land.
2. Isidora Morera Setano. 25. Single. No children. Family has land.
3. Elisia Porras Ruiz. 32. Married. Four children. Landless.
4. Lisbeth Gonzalez Campos. 30. Married. Two children. Landless.
5. Rosa Morera Solano. 35. Married. Six children. Landless.
6. Geanette Gonzalez. 17. Single. No children. Landless.
7. Mirian Gonzalez Campos. 31. Married. Four children. Family with land.

Observations

It is admirable how the women recovered from a total loss with their first experience with the nursery and developed what could be a very profitable business. By visiting the farmer's who planned to plant the women have shown determination and ingenuity. The key to the relative success of this group is again probably due to its strong leadership. It appears although to be somewhat of a one-woman operation; when the leader doesn't show up to work, no one does. The second, smaller group has not had the success of the first group. The women working with the ornamentals are led by a very domineering woman who has not created the enthusiasm found in the larger group. Although the two groups supposedly are still one large group they are slowly separating completely. The women in the larger group would prefer to become completely independent. The officials in CACH have expressed

some hesitancy to work with the groups until they can sort out their differences. COOPEPILANGOSTA strongly supports the women's nursery. The co-op administrator feels they can greatly expand the nursery and produce up to 50,000 seedlings annually for a gross income of 300,000 colones.

Although the women claim that the work in the nursery does not interfere with their work in the home, some of the men claim that their wives are neglecting their work in the home. The home and the children of the leader of the group did appear to be less clean than other homes and children in the area. Whether her work in the nursery is a direct result of this would require much further investigation. The women of Monte Romo clearly demonstrate that they are fully capable and interested in managing small- or even large-scale tree nurseries if these are located close to their homes.

Tree seed collection

The case of Doña Pacha

With the increase in reforestation throughout the country and the resulting need for seedlings, collecting tree seeds appears to be an potential source of employment. Nevertheless, families in the Hojancha area are not accustomed to collect them.

The case of Doña Pacha is an example of an elderly woman who has made considerable family income by collecting *Gmelina* seeds (Figure 21). In early 1987, the husband of Doña Pacha went to speak with a large landowner who had a *Gmelina* planta-



Figure 21. Doña Pacha

tion close to Don Vicente's. The landowner agreed to hire Don Vicente's wife to collect the *Gmelina* seeds.

Doña Pacha is a 60-year-old woman with a remarkable amount of energy. She has 10 living children after having 14 pregnancies. Only two children remain in the house and two grandchildren. The family is quite poor and grow a little corn and raise a few cattle on a 2.8 hectare farm. She is active on the farm and has received a course from INA in fertilization and corn cultivation.

Doña Pacha has planted a number of fruit trees around the house both for family and animal consumption. Project workers from CORENA came to the farm and planted a small parcel of *Gmelina*. The family did not help with the planting. The parcel will be a future source of income for the family for its seeds, fuelwood, posts and timber.

Doña Pacha and her 12-year-old grandson collect *Gmelina* seeds from 5:30 a.m. To 9:00 a.m. from late may to early july. She is paid 150 colones per cajuela and between the two of them can collect up to four cajuelas per day. The seeds fall to the ground and to collect them she merely needs to stoop and put them in the basket (Figure 22). While she is collecting her 15-year-old daughter tends the house.

Over a six-week period in 1987 Doña Pacha earned over 17,000 colones. She uses the money she earns from the collecting to buy food for the family and to fatten up the pigs she raises and sells. Doña Pacha says she loves the work in the "campo." She likes to get out of the house and involve herself in farm activities.

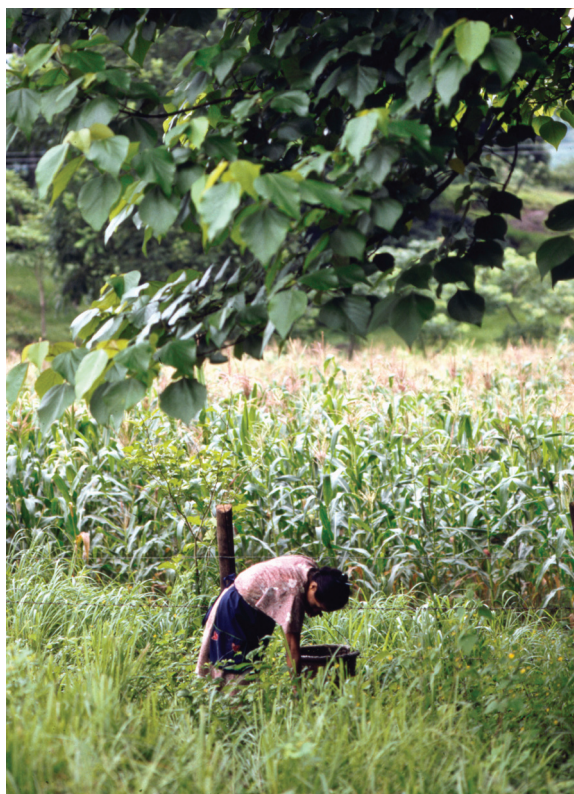


Figure 22. Doña Pacha collecting *Gmelina* seeds.

Survey results

General description of the study area

The area we selected for the survey is the upper watershed of the Nosara River. The watershed has an area of 1882 hectares and encompasses the population centers of Hojancha and Pilangosta. The population within the watershed is 1615 people creating a population density of 86 persons per km² (Ministerio de Salud, 1985). It is difficult to obtain data about the population's income. The majority of the families have monthly incomes that are quite variable, depending on the sale of an animal, the period of harvest, or payment of workers. Many farm owners don't have a clear idea of the amount of their monthly income. CORENA estimates that the majority of the population has a monthly income between 3,000 and 6,000 colones. Almost all the land in the watershed is private property. Table 1 shows the distribution of farms according to size. The majority of the land is used for cattle ranching as Table 2 shows. The area covered by forests is much less than it should be according to the land use capacity. CORENA notes that according to the land use capacity 339 hectares should be reforested. The existing forests are troubled since they permit the free entrance of cattle who affect forest regeneration and harm the soil.

Table 1. Distribution of farms in the watershed according to size.

Size (hectares)	Number of farms	% of farms	Area (hectares)	% of area
0-5	40	37.4	99.5	5.6
more than 5 to 10	18	16.9	117.1	6.6
more than 10 to 25	29	27.1	466.1	26.2
more than 25 to 50	11	10.3	381.3	21.4
more than 50 to 100	8	7.4	586.6	32.9
more than 100	1	0.9	130.9	7.3
TOTAL	107	100.0	1781.5	100.0

(Source: CORENA, 1986)

Table 2. Land use in the upper watershed of the Nosara River.

Land use	Hectares	Percent
Annual crops	90	4.8
Perennial crops	80	4.3
Pastures	1,128	59.9
Scrub	229	12.2
Forest	255	13.5
Urban areas	255	13.5
TOTAL	1,882	100.0

(Source: CORENA, 1985)

Description of families

During the week of the survey we visited 50 households and interviewed 48 women and 44 men. Although we randomly selected 66 households we eliminated 16 of these since they were headed

by single men or the man was out of the area during the week of the interview. Single women headed four of these households. In two households we spoke to the women, but not the men. In other two households, the man was interviewed since their wives were unable to speak with us. In general the households were quite homogeneous. Table 3 presents a description of farm size, family size, age and education of the respondents and their households.

The data on men's age and education is quite incomplete since at the time of the interviews we did not foresee these as variables of importance to the study. Also, these were some of the last questions we had on the questionnaire. Since the women interviewers finished first it created a false impression of a need to speed up the interview with the man – thus resulting in some incomplete data. The data on farm size in Table 1 and Table 3 differ slightly. Table 1 indicates an average farm size of 16.4 hectares while Table 3 shows an average farm size of the respondents to be 25.9 hectares. This does not necessarily signify a bias in the sample toward larger farms. The CORENA data included the amount of land the farmer owned only within the watershed, while our data includes total farm size of all parcels both within and outside the watershed.

Secondly the data from the CORENA study was based on a land tenure map and does not always coincide with the farm size that the farmers report.

Thirdly, the CORENA data is based on 107 farms which belong to 92 owners. When size of farm per owner is considered the average rises to 19.5 hectares.

And finally there has been a gradual concentration of land in the watershed. The CORENA data was gathered in 1984 while ours was gathered three years later. CORENA (1986) compares the land tenure of the watershed in 1977 to 1984. This comparison shows a reduction in number of farms from 118 to 107 and a reduction in owners from 110 to 92. This results in a farm size per owner difference of 16.2 in 1977 to 19.5 in 1984. Although data does not exist for 1987, it is likely that this gradual concentration of land is continuing.

Table 3. General description of respondents.

Variable	N	Mean	Standard deviation	High	Low
Farm size (hectares)	42	25.9	36.55	210	1
Family size	47	5.9	2.24	12	2
Age					
Men*	27	52.3	14.73	83	24
Women	44	47.2	15.92	80	19
Education (years)					
Men*	14	4.2	1.72	6	0
Women	39	4.0	1.47	6	0

*Since the focus of the study was on the women respondents, interviewers did not ask age and education of men in many cases, thus accounting for the large numbers of missing data.

Participation in tree planting

As mentioned earlier, planting trees is not a tradition of the people in Hojanca. Many of the residents and their parents worked hard to clear the land of trees and to many of them it seems absurd to reverse the process and plant trees. Yet in recent years the forestry projects have encountered tremendous success in promoting tree planting. To determine the extent of tree planting in the area we asked the families if they had planted trees on their farm and if they are planning to plant trees. Although the question seems simple enough, many of the respondents answered incorrectly. After a negative response, the interviewer would point to trees on the farm and ask who had planted them. The respondent would then say yes he or she had planted them. The confusion arises from the fact that many respondents associated tree planting only with planting large parcels for timber production and did not consider planting fruit trees and live fence posts as "tree planting." Tables 4 and 5 presents data regarding tree planting by the families. If the respondents said they had planted trees, we asked them for what purpose they planted the trees (Table 6).

As the data shows women tended to say the family had planted trees for fruit and fuelwood, while the men stated timber. Discussions with the women revealed that they had planted most of the fruit trees around the house. Categories mentioned in "other" were for shade, forage, pulp and medicine. Of particular interest are the number of respondents who mentioned conservation as a reason for planting trees. During the interviews both men and women clearly recognized the importance of trees to conserve water and to reduce erosion. Some mentioned they wanted to plant trees so once again Hojanca would be green.

We also asked them of their future plans to plant trees and for what purposes they would like to plant trees. Tables 4, 5 and 7 present these results. In 14 out of 41 cases women had expressed plans to plant trees while their husbands stated no. Again women tend toward planting trees for fuelwood and fruit while the men prefer timber. If respondents had not planted trees or did not plan to plant trees, we asked them to identify the constraints to planting. Sample sizes are too small to make conclusions, however it appears that some of the constraints are lack of title to the land, lack of credit, lack of space on the farm and a lack of need for tree products. Of the 21 respondents citing constraints to planting trees in the future, 15 mentioned lack of space. The average farm size for these respondents is 11.2 hectares. Since many farmers associate tree planting only with plantations this high response is not surprising. If farmers would consider planting trees in agroforestry combinations such as fence posts and as shade in pastures and coffee plantations perhaps fewer would cite lack of space as a constraint.

Participation in reforestation projects

Over three quarters of the male respondents had heard of the various reforestation projects that are active in the watershed (Table 4). However only half of the women were familiar with the projects. This difference tested significant in the chi-square. A

little over one third of the men participated in the projects while only one of the women participated (Table 4). Both men and women expressed a number of reasons for not participating in the reforestation projects. Among those reasons mentioned most frequently are lack of time, interest and land and the fact that they hadn't been invited to participate. Some of the women mentioned they didn't realize there were projects, that project personnel hadn't come to the farm to invite them, that they're too poor to participate, and that the project personnel themselves decide who

Table 4. Men's and women's responses to various questions. Percent answering yes.

Question	Women's response (%) N=48	Men's response (%) N=44	Average (%) N=92	χ^2 and Sign.
Family has planted trees	87.5	75.0	81.5	1.623 0.203
Family will plant trees	87.5	63.6	76.1	5.933 0.007
Recognition of forestry projects	54.2	79.5	66.3	5.531 0.019
Participation in forestry projects	2.1	38.6	19.6	17.237 0.000
Woman can contribute	64.6	29.5	47.8	9.934 0.002
Visited by extensionist	20.8	45.5	32.6	5.262 0.022
Visited by extensionist (Excluding health)	8.3	45.5	26.1	14.537 0.000
Participation in field day*	0	22.7	10.9	
Recognition of demonstration plot	66.7	90.9	78.3	6.569 0.010

* χ^2 invalid when one cell has expected frequency less than five

Table 5. Comparison of husbands' and wives' responses to various questions.

Question	Number of Cases*	W=yes H=yes	W=no H=no	W=yes H=no	W=no H=yes	Binomial prob.
Family has planted trees	42	27	2	9	4	0.267
Family will plant trees	41	22	1	14	4	0.031
Recognition of forestry projects	39	15	1	4	19	0.003
Participation in forestry projects	27	0	17	0	10	0.002
Woman can contribute	38	10	13	14	1	0.001
Visited by extensionist	38	3	16	5	14	0.064
Visited by extensionist (excluding health)	38	0	18	3	17	0.003
Recognition of demonstration plot	41	25	1	2	13	0.007
Participation in field days	41	0	33	0	8	0.008

*Includes only pairs of husbands and wives; if no answer was recorded from one of the pairs the case was dropped from the analysis.

will participate. The men mentioned that they didn't participate because they already had enough trees, they didn't own the farm, they couldn't see the progress, the projects don't take them into account, they hadn't had contact with the project, the projects hadn't offered them credit, the project workers came but never returned, or because they had participated in a project and all the trees died.

Membership to organizations

Hojancha is well known for the strength of its farmer organizations. About 52% of the men interviewed belonged to at least one organization. About 34% of the men belonged to the coffee growers cooperative while 32% belonged to the Cattlemen's Chamber. A t-test shows significance between members and nonmembers for farm size (Table 8). Members owned farms that averaged 38.2 hectares while non-members' farms averaged 12.3 hectares. Seventy percent of the farmers joined the organizations so they could sell their produce which in most cases was coffee or cattle. Almost half of the members cited credit as a reason for joining. Farmers who did not belong listed a number of reasons, some of

Table 6. Reasons for planting trees

	Women N=42 (%)	Men N=35 (%)	Total N=77 (%)
Fruit	83.3	40.0	63.6
Timber	42.9	60.0	50.6
Fuelwood	40.5	28.6	35.1
Conservation	9.5	31.4	19.5
Posts	14.3	14.3	14.3
Landscaping	4.8	5.7	5.2
Other	14.3	11.4	13.0

Table 7. Reasons for planning to plant trees.

	Women N=36 (%)	Men N=26 (%)	Total N=62 (%)
Timber	55.6	73.1	62.9
Fruit	69.4	34.6	54.8
Fuelwood	41.7	11.5	29.0
Conservation	25.0	26.9	25.8
Posts	16.7	7.7	12.9
Landscaping	11.1	0.0	6.5
Other	19.4	0.0	11.3

Table 8. Farm size and men's participation in farmers organizations.

	Number of cases	Mean	Standard deviation
Farm size (hectares)			
Participates	22	38.2	45.65
Doesn't participate	20	12.3	14.50
No answer	2		

T value = -2.52; 2-Tail probability = 0.018

these are lack of land, too old (2), lack of land title, dislike of being bound to something, bad health, lack of financial resources, the organizations are full of thieves, their fertilizer is very expensive.

Only 13% of the women belonged to an organization and in all cases but two this organization was the Asociacion de Desarrollo.

Division of labor in forestry activities

Unlike other parts of the world, men in Hojancha clearly dominate in forestry activities such as tree planting (Table 9) and fuelwood collection (Table 10). Although there is a very small market for fuelwood purchase and sale, when families engaged in these activities in all cases the men of the family performed the task.

Table 9. Division of labor: tree planting.

	Woman's response N=41 (%)	Man's response N=32 (%)	Total N=73 (%)
Husband	24.4	40.6	31.5
Wife	4.9	3.1	4.1
Both	7.3	3.1	5.5
Sons	12.2	9.4	11.0
All	4.9	3.1	4.1
Husband and sons	43.9	37.5	41.1
Project workers	0.0	3.1	1.4
Wife and children	2.4	0.0	1.4

(Based only on those families that plant trees)

Table 10. Division of labor: fuelwood collection

	Woman's response N=41 (%)	Man's response N=41 (%)	Total N=82 (%)
Husband	26.8	51.2	39.0
Wife	0.0	0.0	0.0
Sons	22.0	12.2	17.1
Entire family	4.9	9.8	7.3
Hired help	12.2	2.4	7.3
Husband and sons	31.7	24.4	28.0
Wife and children	2.4	0.0	1.2

(Based only on those families that collect fuelwood)

Contribution of women to reforestation

We asked the women if they thought they could contribute to reforestation (Table 4), and we asked the men if they thought their wives could contribute. There was a significant degree of disagreement regarding the woman's potential contribution. The McNemar test shows that 14 women said yes they could contribute while their husbands said no (Table 5).

T-tests showed a significant difference in education between the women who did and did not think women could contribute to reforestation (Table 11). Age and size of household did not affect their perception. It also appears that men with younger

wives acknowledge women's potential contribution (Table 12). The wives of the men that said yes average 32 years while the wives of the men that said no averaged 50 years. Farm size, size of household and farmer's age didn't seem to affect the perception.

Table 11. Women's attitude toward their contribution to reforestation. Based on three variables.

	Number of cases	Mean	Standard deviation
Number of people in household			
Can contribute	30	5.7	1.88
Can't contribute	16	6.3	2.87
No answer	2		
T value = -0.81; 2-Tail probability = 0.425			
Age			
Can contribute	28	44.7 1	6.41
Can't contribute	15	53.2	13.14
No answer	5		
T value = -1.85; 2-Tail probability = 0.073			
Education (number of years)			
Can contribute	25	4.3	1.50
Can't contribute	13	3.3	1.11
No answer	10		
T value = 2.45; 2-Tail probability = 0.020			

Table 12. Men's attitude toward women's contribution to reforestation. Based on four variables.

	Number of cases	Mean	Standard deviation
Farm size (hectares)			
Can contribute	12	25.0	30.73
Can't contribute	27	26.7	41.27
No answer	5		
T value = -0.15; 2-Tail probability = 0.882			
Number of people in household			
Can contribute	11	5.4	2.58
Can't contribute	27	6.5	2.15
No answer	6		
T value = -1.31; 2-Tail probability = 0.209			
Husband's age			
Can contribute	7	44.9	2.44
Can't contribute	19	54.7	14.56
No answer	18		
T value = -1.53; 2-Tail probability = 0.155			
Wife's age			
Can contribute	11	32.1	13.09
Can't contribute	25	49.5	14.22
No answer	8		
T value = -3.59; 2-Tail probability = 0.002			

The respondents who felt women could not contribute identified a number of constraints to women participation in forestry (Table 13). The most common responses were that the woman was sick or old or that she was too busy with household chores. It is interesting to note however that whereas 41% of the men cited household chores as a constraint to reforestation, only one woman cited this reason. This woman stated household chores as a constraint because she was the only woman in a household of four people. We asked both men and women what forestry activities would be most appropriate for women. Over half of the respondents cited tree nurseries (Table 14). Only about six of the families currently have tree nurseries and in all cases the men take care of them. Many respondents mentioned seed collecting as a potential activity. About 36% of the families have had a family member collect tree seeds. It is usually the children who collect seeds. However one woman collects seeds and produces a sizeable income (see case study). Several respondents, both male and female, indicated that the role of women in forestry could be in persuasion. When asked why they planted, some men said because their wives thought it was a good idea. One man stated that he planted trees because his wife had seen a number of television programs about reforestation and had convinced him of the need to plant trees.

Table 13. Constraints to women's contribution to reforestation. Percent answering yes.

	Woman's response N=14 (%)	Man's response N=27 (%)	Total N=41 (%)
Poor health	28.6	22.2	24.4
Lack of time	21.4	33.3	29.3
Household duties	6.7	40.7	7.1
Advanced age	28.6	22.2	24.4
Lack of land	7.1	7.4	7.3
Lack of knowledge	0.0	3.7	2.4
Not interested	7.1	0.0	2.4
Doesn't live on the farm	0.0	3.7	2.4
Other	7.1	14.8	12.2
Total	106.6	148	

(Based on respondents who said women could not contribute)

Table 14. Potential forestry activities for women.

	Woman's response R=26 (%)	Man's response R=17 (%)	Total R=43 (%)
Tree nursery	53.8	64.7	58.1
Collect tree seeds	26.9	23.5	25.6
Prune	7.7	0.0	4.7
Plant trees	23.1	41.2	30.2
Other	42.3	23.5	34.9
Total	153.8	152.9	

(Based on respondents who said women could contribute)

Extension

We also asked the respondents a number of questions regarding extension, how they learned about tree planting and their information needs. Over one quarter of the respondents said they learned from their parents. Over one third of the women learned from their parents. More than one third of the men said they learned from extensionists while very few of the women had learned from extensionists (Table 15).

As expected women have received very little contact with extensionists (Table 4). Extensionists visited only 10 of the 48 women, and of these six were visits by health extensionists. On the contrary, extensionists visited 46% of the men. When visits by health extensionists are excluded the McNemar tests significant showing that in 17 cases an extensionist visited the man of the household, but not the woman and in no case did an extensionist visit both husband and wife (Table 5). Those men who said they an extensionist had visited them had slightly larger farms than those who said they had not been visited (Table 16). None of the women had participated in field days where foresters from the various projects would teach farmers. On the contrary 23% of the men had participated (Table 4). When asked why they did not participate 84% of the women said they had not been invited.

A number of forestry demonstration plots have been established in the watershed. Many of these are along the main highway thus affording high visibility. Nearly all the men knew about the demonstration plots and had visited them. But only 68% of the women knew about them (Table 4).

Table 15. Information transfer about trees.

	Woman's response N=48 (%)	Man's response N=44 (%)	Total N=92 (%)
Parents	37.5	18.1	28.2
Extensionist	10.4	36.4	22.8
Work experience	8.3	15.9	12.0
Neighbors	0.0	13.6	6.5
School	4.2	6.8	5.4
Radio	2.1	6.8	4.3
Folders	2.1	2.3	2.2

Table 16. Visits by extensionist according to farm size.

	Number of cases	Mean	Standard deviation
Farm size (hectares)			
Visited by extensionist	18	40.2	50.61
Not visited	23	15.0	14.77
No answer	3		
T value = 2.04; 2-Tail probability = 0.055			

Incentives for women's participation

We asked the women what they thought could be done so that women could be better integrated into forestry projects (Table 17). Providing more information and holding meetings were the most common responses.

Table 17. Strategies to integrate women into reforestation projects

	Woman's response N=48 (%)
Provide information	35.4
Hold meetings	25.0
Provide greater motivation	10.4
Provide materials	6.2
Establish projects	4.2
Provide credit	4.2
Provide transportation	2.1
Teach in school	2.1
Other	20.9

Chapter Six: Conclusions and policy implications

Methodology

While conducting the survey we encountered many of the difficulties usually associated with survey research. In many cases we drew blank stares of incomprehension from the respondents. At other times we received answers we knew were incorrect. We found that we were unable to get respondents to successfully rank items from most important to least important. Although in some cases this was the fault of the questionnaire or the interview technique, in other cases it was clearly due to the respondent's lack of experience in answering questions. This survey, like many others in the rural third world, suggest that questionnaire design and interviewer training are crucial and that revision on the basis of pre-tests is essential to ensure usable results.

We found that the simultaneous interviews with the husband and wife worked quite well. In no situation were we refused an interview with the two. In one case the husband told the interviewers that his wife had retired for the night (at 5 p.m.). They returned the next day at a different time only to be told the same, leading the interviewers to suspect that he did not want them to interview his wife. Although interviewing the husband is important in order to attain match responses in many cases it may have been essential in order to gain access to his wife.

Survey research needs to be carefully designed in order to acquire the accurate information needed to integrate women into forestry projects. On a national level it could be used to identify in general those populations that may have greater inclinations toward women's participation and to delineate constraints to greater involvement. On a local level, project designers will probably want to complement survey findings with the information obtained through unstructured interviews, participant observation and informal group meetings.

Women's current role in forestry activities

Currently, women in the Nosara River watershed play a very small role in forestry activities. In nearly all cases their involvement has been limited to planting fruit trees around the house. On the contrary, many of the men have been involved in some type of reforestation project. Most families now recognize the importance of planting trees and are receptive to reforestation once several constraints are removed.

It appears that the reason for women's lack of participation in forestry is not lack of interest nor capability but for lack of motivation and technical assistance and cultural barriers that define a traditional division of family labor.

Women's potential role in forestry activities

Few men perceive their wives as capable or interested in planting trees. Most men claimed their wives were too busy with household duties or they were too old or ill to work outside. Nevertheless, many men were somewhat receptive to their wives' participa-

tion especially if this would bring in additional family revenue and did not interfere with household chores. Most of the women expressed interest in participating in some type of forestry activity. Many women identified family tree nurseries as a project they would be interested in. The reforestation projects have neglected nearly all the women interviewed. When extensionists or project promoters came to the family farm they spoke to the man of the household rather than the entire family. In many cases the women were uninformed of their husband's participation in a project.

Given the shortage of extensionists it would be useful to identify which groups of women would be more prone to participate in forestry projects. The survey indicates that younger women feel they can contribute yet casts doubt on the idea that women who are more educated and have fewer children are more likely than other women to believe the women have a role in reforestation. The case studies, where a diverse group of women participate, show there probably is little influence of family size, age and education on forestry interest and participation. Family income could certainly be a variable. Although we had this variable on the questionnaire few farmers had an accurate idea in monetary terms of their income. Many of the farmers have little to do with the outside economy; their farms produce all their needs. When they do sell cattle, coffee or some fruits, they rarely make records of it.

The case studies demonstrate the potential for women's involvement in forestry. In the case of COPEMATAMBU the women have successfully managed a *Gmelina* plantation for two years. They have received ample technical assistance and credit from reforestation projects. Local foresters admire the plantation and claim it is managed very well. Although many of the women in the group are married and have children, they are able to structure their time so they do not neglect their family. Although there have been cases of husbands resisting their wives' participation, most have been receptive and helpful.

The women's group in Monte Romo also appears to be enjoying a good deal of success. Although the group suffered a major setback their first year when they produced seedlings of a species that farmers would not adopt, they were not discouraged. They visited farmers who were planning on planting trees and asked which species they preferred. Now they have sold all the seedlings they have produced. They have also received a fair amount of technical assistance and credit. During my last week in the area, I saw that they were expanding their activities and were preparing a large parcel of land for direct planting of *Bombacopsis* seeds.

The third case study further reflects the potentials of women becoming involved regardless of age and number of children. A 60-year-old woman who has had 14 pregnancies and 10 living children dedicated up to four hours daily to collecting *Gmelina* seeds. During a two-month period she earned over \$200.

Constraints to women's participation

Tradition has maintained, especially in the rural areas, that the role of the woman is exclusively to be a mother – to give birth and to raise and feed her children. In addition, she must busy herself with preparing meals for the family, draw water, look after the elderly and raise a few farmyard animals. In these tasks she is helped by her young daughters who, when still young, look after their even younger brothers and sisters. In these circumstances women themselves are, on some occasions, some of the hardest obstacles to be overcome. For them the housework seems more than sufficient without adding further work.

In the farming family in Costa Rica it is the man who works and brings in the money to keep the household. The fact that his wife works may be considered a disgrace to him and makes him appear incapable of providing for his home. We were unable to detect how much of a factor this would really be in Hojancha. Wiff (1984) states that in Honduras many women were unable to participate in a forestry project since they did not obtain their husband's permission. Only a small percentage of the men accepted that their wives should work and when they did they considered it a means for their personal fulfillment.

The woman's age may be a constraint to participation. Wiff says that in the above-mentioned forestry project the women who participated were between 30 and 45, an age when they had already produced their "quota" of children. These women can escape the home more frequently since they have older children to tend to the younger children.

Nevertheless, in the Hojancha study we found that about three fourths of the women from 19 to 26 were interested in working in forestry activities.

Possible activities

Family nurseries

Madeleña has established family nurseries in Hojancha and San Ramon so that farmers could produce seedlings to satisfy their own needs. In the majority of the cases, the families tended to abandon the nurseries after their immediate needs were fulfilled – usually by the end of the first year.

In Hojancha (Huacas) in 1983 a multi-family nursery was started with 22 families and 15,000 plants. Each family had its own parcel and plants (therefore it wasn't considered as communal nursery). By 1984 only two brothers continued with their own nursery (2,000 seedlings annually). The majority of the families didn't want to continue because there was no credit for coffee and they only wanted the seedlings for coffee shade.

In San Ramon, the program of family nurseries has grown rapidly in the last few years with good technical results (van Dam, 1987). The continuity after the first year appears to be greater than in Hojancha. However project personnel noted in San Ramon that only giving the farmer assistance during the nursery stage isn't enough.

The program should have follow-ups with the establishment of trees. Nevertheless, this could use up much of the extensionist's

time (an extensionist with motorcycle could attend to 30 family nurseries as his only activity).

The program of family nurseries demonstrates that from a technical standpoint there are no great obstacles. For farmers with long experiences with producing coffee seedlings and establishing and managing coffee plantations, producing and planting trees is relatively simple. Likewise given the limited number of trees that are produced and the presence of the nurseries close to the house, it isn't much of an additional effort for the farm woman. In these cases quite frequently the wife and children have been delegated to do the daily chores of managing the nurseries.

Nevertheless the program hasn't been successful in the sense of continuity since most farmers abandon the project once their needs are fulfilled. From an institutional point of view promoting family nurseries has not been an efficient strategy since the extensionist needs to visit each family separately. Most institutions don't have the human resources to cover all these families. A cost benefit analysis could show that the traditional centralized nursery is cheaper. Also, the development effect wears off rapidly since the farmer doesn't continue after one or two years. A forestry tradition is not reached, nor is a multiplier effect.

Many of the nursery workers I spoke to highly praised the work of women in maintaining nurseries. They claimed the women gave them an extra special maintenance and "seemed to have better luck" with the seedlings. One forest geneticist claimed that women worked better in nurseries than men because the temperature of their hands did not adversely affect sensitive seeds. Although the family nursery would probably be in the best interests of the women of Hojancha, from an institutional standpoint communal nurseries would be much more effective.

Seed collection

This is clearly a potentially lucrative business for women and children. A major constraint would of course be possible travel to the plantation selected for collecting. This activity might also soon become saturated when a constant supply of seeds is met. Given the relatively high fees gained from seed collecting (collectors can earn 150 colones in two hours whereas a hired farm laborer may make 200 colones in an eight-hour day) it will be interesting to observe whether men gain the domain of this activity

Managing plantation

Whereas there are few technical constraints to women's management of plantations, there are severe constraints regarding land and credit.

Husband persuasion

Although many women for various reasons cannot work in nurseries, plant trees or attend meetings, they can play a key role in persuading their husbands to plant trees. By including women in field trips or having special talks for women, project personnel can give women extra ammunition with which they can convince their husbands to plant.

Recommended strategies

The heterogeneity of women as a target group is an important consideration in designing policies of forestry extension services to women. The cross-cultural and intra-cultural complexity of sexual divisions of labor and decision-making in forestry activities means that no single policy strategy can be applied. Hence if we are to assess policy alternatives we need to identify women's specific sex role and class-related situations; these variables define distinct target populations among women. Communicating technical information to farming populations also involves cross-cutting lines of communication between men and women, whether at the decision-making or the implementation stage of adoption. Both of these considerations indicate that male and female extension staff need to work in tandem in the field, not in separate programs.

Popular participation

As stated in Chapter 1, the ultimate beneficiaries of any project should be involved at the beginning, center and end of any development intervention. Given Costa Rican institutions' lack of experience of working with women this concept is probably even more valid in the case at hand. Since the women of Hojancha know best their capabilities, interests and amount of time available it would seem futile that any project be designed without their direct participation. When asked what they thought could be done so that women could be integrated into forestry projects many women said provide information and hold a meeting. Since many of the women expressing interest in reforestation lived near the community center of Pilangosta it would seem to be a logical area to initiate a pilot project.

Based on the tenet that user-initiated change will have the strongest user commitment and the best chance for long-term survival, forestry projects should allow the women to formulate their own project. Since most women are not aware of the possibilities open to them in forestry activities they would need some type of intervention, preferably a female extensionist, who could "prime the pump" and begin to formulate a project. Ideally, this would be a "barefoot extensionist" – a local woman who has received outside training and could serve as the community forestry promoter. This barefoot extensionist and other community leaders would organize a series of meetings that would bring the women in the community together.

Using Havelock's linkage model, the women could proceed to identify their needs and translate them into a problem statement and diagnosis. With this diagnosis the women could then proceed to the search and retrieval aspect of the mode and consult the external resource system. The resource system is of vital importance at this stage both for providing technical assistance and credit as well as nondirective guidance in formulating solutions. One of the possibilities at this point could be a field trip to the women's nursery in Monte Romo and the plantation in Matambu. Once the women identify their potential activities they could then identify the constraints and methods to overcome them.

With the help of the change agent they would draw up a proposal and submit it to a selected reforestation project.

Extension and training

Women must be recruited into advanced formal forestry training if forestry research and extension systems are to incorporate the female staff necessary for effective communication with women. The acute shortage of women in forestry secondary and university programs reflect sex-stereotyping of forestry. Forestry training for women at the farmer level presents a different set of needs.

First, organizers need to plan training courses on a day-session basis in accord with women's schedules to enable rural women to attend. Residential courses appear to be impractical in this respect.

Second, extensionists need to design training methods for women that are illiterate or semi-literate if they are to reach beyond a very small elite of rural women. This implies project implementors should emphasize practical field demonstrations rather than classroom-centered approaches. Since educational levels are usually lower for women than for men, many women may have difficulty understanding the leaflets, booklets and wall charts that extension services distribute. Extensionists should stress interpersonal communication as much as possible, supported by simple audiovisual aids such as flipcharts and posters. Movies and slide shows about community forestry, held in the evening, may attract a considerable number of women and children.

Although female extensionists would probably be the ideal situation it appears that there have been no serious problems with the male extensionists, at least when they work with groups of women. Project implementors should seriously consider training several local women to work as "barefoot extensionists." These extensionists would put lesser strain on the project's budget, inject funds directly into the community and possibly be more effective than outside extensionists. Barefoot extensionists could possibly alleviate the problem of technical assistance on family nurseries.

Research needs

The conclusion from this research applies to one small area of Costa Rica. Since the sexual division of labor and intra-family relations differ not only between countries but within countries, these conclusions may not apply to other areas of Costa Rica. Projects attempting to integrate women based on country-wide generalizations are likely to fail. Therefore site-specific studies on the sexual division of labor and intra-family communication should be undertaken in each proposed project area.

Future research should not focus so much on women's interest and participation in forestry, but on the technicalities of orienting projects more toward women. For example, future research should examine methods to facilitate financial credit for family forestry projects. Future research should also focus on improving extension techniques with women. Since extension has nearly always centered on the men, many of the extension practices may

be inappropriate to teaching women. Researchers could explore the use of methods suggested by Havelock and Freire as possible teaching and problem-solving methods.

Researchers could focus on solutions to the technical assistance problem found with home tree nurseries. Research on marketing

forest products will always be of value both for men and women. Other research needs are in the integration of landless women into forestry projects and the role of women in a cattle ranching economy compared to women in a crop production economy.



Appendix 1: Questionnaire

This questionnaire reproduced here is an English translation of the actual survey which was written and conducted in Spanish.

Name of respondent

Interviewer date

Number of farm man/woman

1. Has you planted trees on your farm? Yes/No

1.1 If yes: why?

1.1.1 Fuelwood

1.1.2 Fruit

1.1.3 Timber

1.1.4 Posts

1.1.5 Conservation

1.1.6 Decoration

1.1.7 Other

1.2 If no: why haven't you planted trees?

1.2.1 Land tenure

1.2.2 Lack of credit

1.2.3 Lack of space on farm

1.2.4 Trees consume water

1.2.5 Already have sufficient

1.2.6 Lack of knowledge

1.2.7 Spouse in charge of planting

1.2.8 Other

2. Of the reasons you mentioned, which do you think is the most important reason that you planted (or didn't plant trees)? Which is the second most important? Etc.

Interviewer: put the number that corresponds with the previous question.

1.	4.
2.	5.
3.	6.

3. Would you like to plant trees on your farm in the future? Yes/No

3.1 If yes, why?

3.1.1 Fuelwood

3.1.2 Fruit

3.1.3 Timber

3.1.4 Posts

3.1.5 Conservation

3.1.6 Decoration

3.1.7 Other

3.2 If no: why aren't you going to plant trees

3.2.1 Land tenure

3.2.2 Lack of credit

3.2.3 Lack of space on farm

3.2.4 Trees consume water

3.2.5 Already have sufficient

3.2.6 Lack of knowledge

3.2.7 Spouse in charge of planting

3.2.8 Other

4. Of the reasons you mentioned, which do you think is the most important reason that you will (or will not) plant trees? Which is the second most important? Etc.

Interviewer: put the number that corresponds with the previous Question.

1.	4.
2.	5.
3.	6.

5. Besides fuelwood, which other products do you obtain from trees?

6. Do you know about any program or project that motivates people to plant trees? Yes/No

6.1 If no, go to question 8

6.2 If yes: which ones?

6.2.1 Cach

6.2.2 Madeleña

6.2.3 CORENA

6.2.4 COOPEPILANGOSTA

6.2.5 Other

7. Do you participate in these projects? Yes/No

7.1 If no: why not?

7.1.1 Not enough time

7.1.2 Lack of interest

7.1.3 Lack of land

7.1.4 It never occurred to me

7.1.5 Other

7.2 If yes::

7.2.1 Which project(s)

7.2.1.1 Cach

7.2.1.2 Madeleña

7.2.1.3 CORENA

7.2.1.4 COOPEPILANGOSTA

7.2.1.5 Other

7.2.2 In which activities have you participated?

7.2.2.1 Planted trees in pasture

7.2.2.2 Established a nursery

7.2.2.3 Planted a plantation

7.2.2.4 Other

7.2.2.5 Other

7.2.3 What motivated you to participate in this project?

- 7.2.4 Does your spouse also participate in this project? Yes/
No
- 7.2.4.1 If no: why not?
- 7.2.4.2 If yes: in which activities?

8. Do you participate in any of the organizations that I am going to read?

- 8A COOPEPILANGOSTA
- 8B CACH
- 8C asociacion de desarrollo
- 8D camara de ganaderos
- 8E apiHojancha
- 8F other
- 8G none
- 8.1 If none: why don't you participate?
- 8.1.1 No interest
- 8.1.2 No time
- 8.1.3 Don't see any benefit
- 8.1.4 It's not for women
- 8.1.5 Other
- 8.2 If yes: what benefits do you receive from the organizations?
- 8.2.1 Credit
- 8.2.2 Technical assistance
- 8.2.3 Helps to buy at lower cost
- 8.2.4 Helps to sell product
- 8.2.5 Other

9. Do you plant trees on your farm? Yes/No

- 9.1 If no: go to question 10
- 9.2 If yes: who plants the trees on your farm?
- 9.2.1 Husband
- 9.2.2 Wife
- 9.2.3 Both
- 9.2.4 Children
- 9.2.5 Everyone
- 9.2.6 Hired hand

10. Who collects the fuelwood?

- 10.2.1 Husband
- 10.2.2 Wife
- 10.2.3 Both
- 10.2.4 Children
- 10.2.5 Everyone
- 10.2.6 Hired hand

11. Who takes care of the trees?

- 11.2.1 Husband
- 11.2.2 Wife
- 11.2.3 Both
- 11.2.4 Children
- 11.2.5 Everyone
- 11.2.6 Hired hand

12. Do you purchase fuelwood? Yes/No

- 12.1 If no: go to question 13
- 12.2 If yes: who buys the fuelwood?
- 12.2.1 Husband
- 12.2.2 Wife
- 12.2.3 Both
- 12.2.4 Children
- 12.2.5 Everyone
- 12.2.6 Hired hand
- 12.3 How much do you pay for the fuelwood?

13. Does the family sell fuelwood? Yes/No

- 13.1 If no: go to question 14
- 13.2 If yes: who sells your fuelwood?
- 13.2.1 Husband
- 13.2.2 Wife
- 13.2.3 Both
- 13.2.4 Children
- 13.2.5 Everyone
- 13.2.6 Hired hand
- 13.3 How much do you sell the fuelwood for?

14. Does anyone in the family collect tree seeds? Yes/No

- 14.1 If no: go to question 15
- 14.2 If yes: who collects the seeds?
- 14.2.1 Husband
- 14.2.2 Wife
- 14.2.3 Both
- 14.2.4 Children
- 14.2.5 Everyone
- 14.2.6 Hired hand
- 14.3 Which type do you collect?
- 14.3.1 Pochote
- 14.3.2 Melina
- 14.3.3 Teak
- 14.4 For what use?
- 14.4.1 Sell
- 14.4.2 Nursery
- 14.4.3 Other
- 14.5 Do you collect any other species?
- 14.5.1 Pochote
- 14.5.2 Melina
- 14.5.3 Teak
- 14.6 For what use?
- 14.6.1 Sell
- 14.6.2 Nursery
- 14.6.3 Other

15. Do you have a tree nursery on your farm? Yes/No

- 15.1 If no: why don't you have a nursery?
- 15.1.1 Lack of knowledge
- 15.1.2 Lack of time
- 15.1.3 Never occurred

- 15.1.4 Price of materials too high
- 15.1.5 Lack of interest
- 15.1.6 Other

15.1.1 If the family had a nursery, who would take care of it?

- 15.1.1 Husband
- 15.1.2 Wife
- 15.1.3 Both
- 15.1.4 Children
- 15.1.5 Everyone
- 15.1.6 Hired hand

15.2 If yes: who takes care of the nursery?

- 15.1.1 Husband
- 15.1.2 Wife
- 15.1.3 Both
- 15.1.4 Children
- 15.1.5 Everyone
- 15.1.6 Hired hand

16. For women: do you think you can contribute in reforesting your farm?

For men: do you think your wife could contribute in reforesting your farm?

Yes/No

16.1 If no: why not?

16.2 If yes: in which activities?

17. For women: would you like to participate in reforestation?

For men: would you like your wife to participate in reforestation?

Yes/No

17.1 If no: why not?

17.2 If yes: in which activities?

18. What do you think could be done so that women participate more in reforestation?

19. Now let's talk about how you learn about trees? How do you learn about tree planting and who taught you?

- 19.1 Extensionist
- 19.2 Field day
- 19.3 Demonstrative plots
- 19.4 Neighbors
- 19.5 Folders
- 19.6 Radio
- 19.7 Other

20. Do you know any demonstration plot for trees? Yes/No

20.1 If no: go to question 21

20.2 If yes: have you visited any of the plots? Yes/No

20.2.1 If yes: what called your attention about the plots?

- 1. How pretty they are
- 2. How fast they grow

- 3. How straight they are
- 4. Other

21. Have you participated in a field day? Yes/No

21.1 If no: why not?

- 1. Wasn't invited
- 2. No time
- 3. No interest
- 4. Other

21.1 If yes: why did you participate?

22. Has an extensionist or promoter spoken to you this year or last? Yes/No

22.1 If no: go to question 23

22.2 If yes: what advice or information did he give you?

23. What type of information about trees would you like to have?

- 1. Pest control
- 2. Types of species to plant
- 3. Thinning
- 4. Market
- 5. Other
- 6. Nothing

24. What do you think should be done so more people plant trees on their farm?

- 1. Offer more information
- 2. Offer more credit
- 3. Establish more nurseries
- 4. Provide more market security
- 5. Other

25. How many people live in this house?

(Central family = all those whose presently eat and sleep there)

26. How old are you?

27. How many years of schooling have you had?

28. For woman only: do you have any income source? Yes/No

28.1 How do you earn this income (what activity)?

28.2 How much time per week do you dedicate to this activity?

29. How much do you think the family's monthly monetary income is?

30. What size is your farm? Ha mz.

31. Observations

Bibliography

- Agarwal, Bina (1986) Cold hearths and barren slopes: the woodfuel crisis in the third world. London: Zed Books Ltd.
- Ashby, Jacqueline A. (1981) New models for agricultural research and extension: the need to integrate women. In: Lewis, Barbara, ed. *Invisible farmers: women and the crisis in agriculture*. Washington, D.C.: USAID.
- Beltran, Luis Ramiro (1976) Alien premises, objects and methods in Latin American communication research. *Communication Research* 3(2): 107–134.
- Bozzolli de Wille, Maria E. (1975) Localidades indígenas costarricenses. Editorial Universidad Centroamérica. Educa-San José.
- Boserup, Ester. (1970) Women's role in economic development. London: Allen and Unwin, Ltd.
- Byrnes, Francis C. (1968) Some missing variables in diffusion research and innovation strategy. New York: Agricultural Development Council, Inc.
- Carr, Marilyn (1985a) Technologies for rural women: impact and dissemination. In: I. Ahmed (ed.) *Technology and rural women*. Boston: George Allen and Unwin.
- Carr, Marilyn (1985b). Appropriate technology and rural women: has anything changed? *Ekistics* 310, Jan/Feb: 90–93.
- CATIE (1982) Caracterización de sistemas agrícolas de Hojancha, Guanacaste, Costa Rica. Turrialba, Costa Rica: CATIE.
- Cernea, Michael (1985) Putting people first: sociological variables in rural development. Published for the World Bank by Oxford University Press.
- Deere, Carmen Diana (1982) The division of labor by sex in agriculture: a Peruvian case study. *Economic Development and Cultural Change* 30: 795–811.
- Diaz Bordenave, Juan (1976) Communication of agricultural innovations in Latin America: the need for new models. *Communication Research* 3(2): 135–154.
- Dixon-Mueller, Ruth (1985) Women's work in third world agriculture. Geneva: International Labour Office.
- Felstehausen, Herman (1973) Conceptual limits of development communications theory. University of Madison, Land Tenure Center reprint no. 102.
- Fortmann, Louise P. (1986) Women in subsistence forestry. *Journal of Forestry* 84(7): 39–42.
- Fortmann, Louise P. (1981) The plight of the invisible farmer: the effect of national agricultural policy on women in Africa. In: Roslyn Dauber and Melinda Cain (eds.) *Women and technological change in developing countries*. Westview Press for American Association for the Advancement of Science.
- Freire, Paolo (1970) *The pedagogy of the oppressed*. New York: Herder & Herder.
- Harding, S. (1976) Women and words in a Spanish village. In: D.G. McGuigan (ed.) *New research on women and sex roles*. Ann Arbor: University of Michigan Press.
- Harrison, Paul (1983) Basic concepts: the new development models. In: *The third world tomorrow*. New York: Pilgrim Press.
- Hartshorn, Gary S. et al. (1982) Costa Rica: country environmental profile; a field study. San José, Costa Rica: Tropical Science Center.
- Havelock, R.G. (1971) Planning for innovation through dissemination and utilization of knowledge. Ann Arbor, Michigan: Institute for Social Research.
- Havelock, Ronald G. and Mary C. Havelock (1973) Training for change agents. A guide to the design of training programs in education and other fields. Ann Arbor, Michigan: Institute For Social Research.
- Hoskins, Marilyn (1981) Women in forestry for local community development: a programming guide. In: Lewis, Barbara, ed. *Invisible farmers: women and the crisis in agriculture*. Washington, D.C.: USAID.
- Jansen, Golie (1986) Training women in agricultural extension: lessons from an experience in Papua New Guinea. *Ideas and Action* 167(2): 15–19.
- Kearl, Bryant (1976) Communication for agricultural development. In: Wilbur Schramm and Daniel Lerner (eds.) *Communication and change: the last ten years—and the next*. Honolulu: The University Press of Hawaii.
- Maurer, Ellen Allbeck (1981) An attempt at an empirical evaluation of Havelock's user-oriented model for communicating technical information in a low-income, low literacy rural area: eastern Nicaragua. Master's thesis. Department of Agricultural Journalism, University of Wisconsin.
- McLeod, Jack and Chaffee, Steven (1973) Interpersonal approaches to communications research. *American Behavioral Scientist* 16(4) 469–499.
- Muzaale, Patrick and Leonard, David K. (1985) Kenya's experience with women's groups in agricultural extension: strategies for accelerating improvements in food production and nutritional awareness in Africa. *Agricultural Administration and Extension* 19: 13–28.
- Noronha, Raymond and Spears, J.S. (1985) Sociological variables in forestry project design. In: M. Cernea (ed.) *Putting people first: sociological variables in rural development*. Published for the World Bank by Oxford University Press.
- Palmer, Ingrid (1977) Rural women and the basic needs approach to development. *International Labour Review* 115(1): 97–107.
- Petheram, R.J. and Basuno, Edi (1986) Livestock component farming systems research in Java – the case for work with women. *Agricultural Administration* 21: 119–127.
- Piepmeyer, Katherine Blakeslee (1980) Women's organizations: resources for development. Washington: USAID.
- Rogers, Everett (1983) *Diffusion of innovations*. 3rd edition. New York: The Free Press.
- Rogers, Everett (1973) *Communication strategies for family planning*. New York: The Free Press.
- Rogers, Everett M. and Adhikarya, Ronny (1978) Communication and inequitable development: narrowing the socio-economic benefits gap. *Media Asia* 5(1): 3–9.
- Roling, Niels G. et al. (1976) The diffusion of innovations and the issue of equity in rural development. In: *Communication and development*. Berkeley: Sage Publications.
- Rosaldo, Michelle and Lamphere, Louise (eds.) (1974) *Women, culture and society*. Stanford, CA: Stanford University Press.
- Scott, Gloria (1980) Forestry projects and women. Draft paper. Washington, D.C.: World Bank, Projects Policy Department.
- Scott, Gloria and Carr, Marilyn (1985) The impact of technology choice on rural women in Bangladesh: problems and opportunities. Washington, D.C.: The World Bank. Staff working paper number 731.
- Stewart, J. (1984) Community forestry development in Nepal. *Commonwealth Forestry Review* 63(2): 121–27.
- Tinker, Irene and Bramsen, Michèle Bo (eds) (1976) *Women and world development*. Washington DC: Overseas Development Council.

-
- Universidad Nacional Autónoma, Escuela de Ciencias Agrarias (1986a) Estudio Sistemático de la Realidad Agraria de una Micro-region de Costa Rica: Historia Agraria de la península de Nicoya. Heredia, Costa Rica.
- Universidad Nacional Autónoma, Escuela de Ciencias Agrarias (1986b) Estudio sistemático de la realidad agraria de una micro-region de Costa Rica: Zonificación del espacio agro-ecológico de acuerdo a problemáticas homogéneas. Heredia, Costa Rica.
- Van dam, Chris E. (1987) Estrategia de extensión forestal para el Proyecto Madeleña con especial referencia a Costa Rica y Honduras. Informe de Consultorio. Turrialba, Costa Rica: CATIE
- Wahyuni, Sri; Knipscheer, H.C. and Gaylord, M. (1987) Women's decision-making role in small ruminant production: the conflicting views of husbands and wives. *Agricultural Administration and Extension* 24: 91–98.
- Wiff, M. (1984) Honduras: women make a start in agroforestry. *Unasylva* 36 (146): 21–27.
- Yin, Robert K. (1985) Case study research: design and methods. Beverly Hills, California: Sage Publications.